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Large Electric Kitchens

SOME applications of electricity may be said to sell themselves; the public needs little persuasion to take advantage of them, and is willing to pay well for doing so. Others require that every point in their favour shall be convincingly argued, and even then the rate per kWh may have to be very low to make their introduction practicable.

Commercial cooking partakes of both natures, since while it is economical at a price that leaves appreciable margin for development costs, the chances of adoption depend more upon the skill with which its case is presented than do most other loads.

The present position cannot be regarded as satisfactory. In his classic I.E.E. paper as long ago as 1917 Mr. W. A. Gillott was able to obtain information relating to a connected load in large British kitchens of 22,000 kW; yet the figure now is hardly more than three times as much. Indeed, an increase that is so very much less than proportional to the subsequent growth of output for all purposes really represents a material loss of ground.

In their recent I.M.E.A. paper Messrs. S. C. Hurry and W. E. Swale estimated the potential load to be provided by commercial cooking and baking at one million kWh, with a corresponding consumption of 900 million kWh (an amount comparable with that now sold for traction by authorised undertakings). This means that the present achievement is only some 7½ per cent. of the possible figures.

The claims of the large electric kitchen seem so well supported from the points of view of both supply undertakings and users, whether hotels and restaurants, institutions or factory canteens are concerned, that it is difficult to account for its tardy development. Probably Messrs. Hurry and Swale have pointed to the weak spot in the scheme of things in their reference to the duties of the commercial cooking expert. How many engineers, though well equipped to discuss the processes of manufacturing with industrial consumers, are able to convince a chef that his traditional methods may not be the best under present-day conditions?

Cooking specialists are needed, who can, incidentally, earn their keep by selling energy at rates more satisfactory to the undertaking than those obtainable when low tariffs are regarded as a substitute for salesmanship. The difference between the revenues derived from 900 million kWh at 0.5d. and 0.65d. per kWh, due to negotiating ability, would maintain a small army of experts, quite apart from the value of the load itself.

There seems, then, no sound reason why the rapid advance made in recent years by domestic cooking should not be paralleled in commercial kitchens. The authors of the I.M.E.A. paper suggest that that body should arrange four or five years hence for another paper to be read reviewing the progress made.

If in the meantime supply undertakings will make full use of the data—and ideas—contained in this paper and others that have appeared, including articles in our own columns, and if they will add to the common stock by keeping close records (small meters are inexpensive) of public kitchens connected to their mains as the authors ask, the record of progress available on the next occasion should be a more imposing one.

Still Cheaper 'Phones

THE telephone concessions announced by the Postmaster-General on Monday last bring nearer the day when the service will be employed in the majority of homes. It seems not so long ago that the telephone was a luxury for the privileged few, but remarkable strides have been made during the past four or five years. The allowance of 50 free calls a quarter means, in the majority of cases, that the rental is practically all that there is to pay, and that is offset by the saving in petrol or bus fares which the daily round involves in the average household. The 'phone is essential in business, but nevertheless the P.M.G. has decided to reduce charges for the service in shops and offices by 2s. 6d. a quarter. Larger subscribers will also receive substantial benefit from the reduction in the charges for

private lines. To meet the growing demand and maintain the service up to date the Post Office is to spend £13,530,000 on engineering works this year, of which £4,440,000 is required for trunk lines. A notable technical advance will be the provision of a number of ultra-short-wave radio "channels" between this country and France.

Overhead Lines

WHILE progress in cable manufacture suggests the likelihood of there being more underground work in rural areas in the future than in the past, developments in overhead transmission are by no means at a standstill. Messrs. P. V. Hunter and H. J. Allcock in our issue of May 29th gave particulars of a new rural cable which, in conjunction with the cable-laying plough described by Sir B. Greenwell in the same issue, is expected to influence practice considerably. This week Mr. J. S. Forrest indicates some of the ways in which the cost of overhead lines is being reduced and their reliability increased. Possibly the most notable of recent improvements is in the design of insulators, largely due to work carried out at the C.E.B. research station at Croydon, which seems to be solving the difficulties attending high-voltage operation in damp and dirty atmospheres.

Mutual Satisfaction

POOR power-factors are costly to an electricity undertaking and result in the price of energy being higher than it need be, thus retarding development. At Worcester the city electrical engineer (Mr. C. M. Shaw) resolved to tackle the problem, not so much by imposing penalties as by offering a prize for those who were "good." He instituted a reduction in charges to power consumers in terms of improved p.f. His staff produced data and test figures for the consideration of consumers showing that the saving in the cost of energy would enable them to meet the capital charges in respect of corrective apparatus in from one and a half to three years. The result has been very gratifying. At the end of the last financial year industrial consumers with an aggregate maximum demand of 997 kW had already installed correction apparatus, and thus liberated 774 kVA of transformers and high-voltage cables for meeting increases in demand. It is anticipated that by the autumn 1,900 kW of industrial load will be operating under improved power-factor.

Low-voltage Switching

A SWITCHGEAR manufacturer informed us recently that the problems involved in the design of heavy-duty circuit-breakers were quite eighty per cent. mechanical. The effect of the mechanical strength of components in limiting the current that can be dealt with by a breaker is one of the most important of the points discussed by Mr. C. J. O. Garrard on a later page. This consideration applies particularly to lower-voltage switchgear on account of the heavier currents (determining the heating and electro-magnetic effects) that it has to carry as compared with breakers for higher voltages. The author's suggestion of 25,000 kVA as the maximum short-circuit power for which 660-V breakers at a reasonably low price should be constructed is higher than the 16,600 kVA recommended by Mr. H. W. Clothier at Edinburgh last month. It would appear, therefore, that Mr. Garrard's views as to the upper limit that should be stipulated in the forthcoming new B.S. Specification are well within the bounds of what is requisite.

What's in a Name?

SUMMER gatherings of engineering associations have been given divers official designations, most of which seem intended to emphasise their essentially serious purpose, possibly in deprecation of a tendency on the part of the irreverent to refer to them as "joy-rides." Thus the I.M.E.A., like the Mining Electricals, holds a convention, which the Oxford English Dictionary defines as a formal assembly. The most widely used collective word is "conference," which the same authority calls an annual assembly, but which (quaintly) it would rather like to confine to a religious denomination; this has been chosen by the E.C.A. and the Municipal Tramways Association and appears in the title of the World Power Conference, which has just been running a Chemical Engineering Congress as a side-show. Congress, termed "a formal meeting for discussion," is also used to describe the proceedings of the other tramways body—the one representing the companies. Another word with the same initial syllable is conversazione, which is described as "a soiree given by a learned society," such as the I.E.E., which is otherwise content to hold a summer meeting (a word which the O.E.D. unkindly suggests implies entertainment). The Students' Section frankly calls its annual excursion an outing, although the occasion is an "improving" one. There remain reunions, which in practice follow banquets, and these are referred to as social gatherings of persons with common interests. That is the underlying meaning of all these annual functions and gives them their place in our industry.

The Virtuous Circle

THE average price paid by domestic consumers in New Zealand last year, Mr. F. T. M. Kissel states in the *Daily Telegraph*, was only 1.31d. per kWh. This is comparable with 2.28d. in Great Britain during the previous year. That is a remarkable result considering that the population density there is only 70 per sq. mile against over 500 here, including the large sparsely inhabited area of North Scotland. No doubt the main reason is that in the Dominion 1,180 kWh was sold per residential consumer, one in six using an electric water heater. This view can be supported by reference to the average price of 1.5d. per kWh sold to domestic premises and shops in the Bedford rural demonstration area, where the population density is 190 per sq. mile and the consumption 700 kWh per head. Which is only another way of saying that the more electricity is used, the lower becomes the price that can be charged for it—and conversely.

Compulsory Gas Fittings

THE Gas Light & Coke Co. has persuaded a House of Lords Committee to pass its new Bill, which empowers it to install gas fittings in houses being erected by local authorities in its area. This seems to permit the company to go to inordinate lengths to secure new business; in fact, it might even be described as legalised trespass, but presumably the Bill will be allowed to proceed to the Statute Book. Unless the electricity supply authorities in the company's area are permitted to wire Council houses during erection, if they wish to do so, the gas company will undoubtedly receive a remarkably good start. Much as we deplore the Committee's decision, we cannot help admiring the cool effrontery of the gas company in seeking legislative sanction to its business-getting methods.

New Lamps for Old

THINGS have altered pretty considerably in Bagdad since the wondrous days of the great Caliph Haroun-al-Raschid. Fresh marvels have supplanted those which are recorded in "The Thousand and One Nights" since the introduction of electricity. The magic carpet is no more; had there been an electric vacuum cleaner available its life might have been prolonged until this generation. Bottled-up genii of a new order spring to service at the touch of a switch. Magic lamps, the older means of summoning genii, have given way to still more magic electric lamps. These thoughts are prompted by the speech of Sir W. G. Max Muller at last week's meeting of the Bagdad Light & Power Co., in which it was stated that during the past year the number of consumers in the ancient city had increased by 2,140 to over 11,000. The company looks forward to continued and progressive development.

Electrical Contractors in Conference

Views expressed at the Folkestone gathering

STRIPPED of its philosophical trimmings, the discussion on the paper read by Mr. L. C. PENWILL, director and secretary, at the annual conference of the Electrical Contractors' and Allied Associations at Folkestone last week, turned mainly on the pivots of control by co-operation, the Fair Trading Policy, the safety of installations and apparatus, the McGowan Committee's report, the hiring out of apparatus by supply undertakings, and load development.

A study in expressions: The President delivering his address; Mr. H. T. Young, president-elect of the I.E.E.; Mr. L. C. Penwill reading his paper; Mr. W. Finlay (E.C.A. of Scotland); Mr. E. E. Hoadley (borough electrical engineer, Maidstone)

In a strong plea for the preservation of individualism to avoid a catastrophe, Mr. H. M. DRAKE (London) called for a form of co-operation which would still leave scope for individual action. He did not want actual control by a majority, but he asked Association members to abide loyally by the Council's decisions or elect new leaders. Some such idea seemed also be reflected in some remarks by Mr. C. W. SULLY (E.L.M.A.), who said that the associations of this country did not develop into dictatorships. Quoting from Lord Hirst, he said that no association could be successful unless every member was prepared to give up something for the good of the rest.

The dance at the Leas Cliff Hall

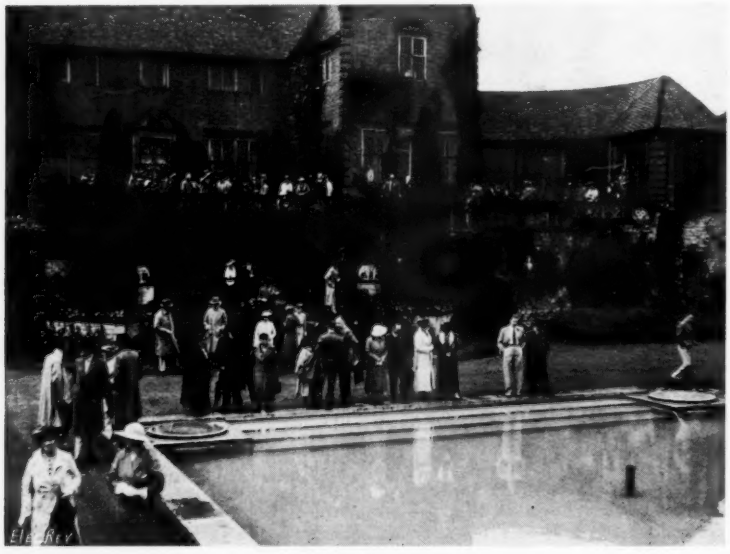
That the industry was getting obsessed with its own difficulties which, after all, were not really so very great, was a view expressed by Mr. A. ALBRECHT (E.W.F.). He admired all men who attempted leadership to-day, but stressed the need for turning out of office those who were not capable of handling affairs. Mr. T. W. HEATHER (G.E.C.) pointed out that we all got the government we deserved. But he struck a nearer practical note in his plea for greater interest in local government by business men, and a still nearer note in his comments on electrical association work generally. All progress since the War had come out of association, but association should not be allowed to take the form of vested interest. Nor should it be used to remove competition, but rather to replace price-cutting with service competition, and because loyalty to an association often clashed with immediate individual interest he also emphasised the necessity for the eradication of fear.

Interchange of opinion and dictatorship were the only alternative solutions seen by Mr. E. E. HOADLEY (Maidstone), who seemed to suggest that co-operation between contractors and supply undertakings was an easier matter than co-operation within the supply field only. His success at Maidstone led him to urge monthly meetings between supply representatives and contractors in every town in the country as a means of arriving at a working arrangement for the country as a whole, while he asked for the indulgence of contractors in consideration of the differences between the municipal and company sections of supply. Generally the companies had very much wider powers. Mr. W. FINLAY (E.C.A. of Scotland) replied in rather forcible terms, suggesting that supply authorities themselves should first get together.

Mr. H. T. YOUNG re-echoed the call of Mr. Kennedy in his I.E.E. presidential address for the appointment of a public relations officer. He considered that the McGowan Committee's recommendations would provide a solution of the major difficulties and he asked the contractors to accept completely that side of the report with which they were concerned and give every assistance in the work of standardisation which would eventually result.

Morning coffee at the first session: The left-hand group includes Mr. and Mrs. H. Marryat and Mr. and Mrs. C. G. Maisey. In the other picture Mr. Penwill hands round the cakes

That the McGowan Report emphasised the necessity of co-operation was the view of Mr. F. W. PURSE (London and Home Counties J.E.A.), who reminded the conference that at Scarborough a few years ago he warned supply men that unless they put their house in order some such enforced reorganisation as would no doubt result from the McGowan Report would be applied. It was in this reference to this report that Mr. Finlay turned the thoughts of the conference to the Fair Trading Policy, for he said it was incumbent upon all those interested to see that the clause concerning retail trading in



At Port Lympne

the resulting Parliamentary Bill should be along the lines of the Policy.

Mr. Heather said that the Policy represented the best platform to-day and that manufacturers were trying to work out their section of the Policy. Mr. Purse was at a loss to understand the opposition of some of his municipal colleagues to the Policy. He also spoke just as strongly on the question of safety in the use of apparatus and said that it was as necessary to protect the public against shoddy equipment by State measures as it was to protect them against impure foods. Mr. Hoadley agreed that the only way to ensure safety was to prohibit the sale of shoddy equipment, and he was also in agreement in principle with the call for enforced wiring regulations, in connection with which he asked for some latitude because he did not see the necessity for the same stringency in the case of, say, a small suburban villa as in a public hall. In any case, however, he did not want supply authorities to have the responsibility of seeing that every consumer had a perfect installation.

The contractors had no wish to put such a burden on supply authorities, said Mr. H. J. CASH, who appealed to the I.M.E.A. for real co-operation on the subject of the registration of approved apparatus. The much-called-for proving house would be too costly and unnecessary, for the skeleton machinery for registration was already in existence. Apparatus not suitable for standardisation because it was not generally manufactured could be certified as safe by some such authority as the National Physical Laboratory or the Electrical Research Association, and the certificate obtained at the expense of the manufacturer in question could be taken to the British Standards Institution for approval. All sensible people agreed that shoddy material should be kept off the market said Mr. Heather, but he drew attention to certain Ministry of Health instructions which, if acted on literally, permitted buying on price alone, so that there was no margin for development. Mr. GALLAGHER (Dublin) asserted that the only improvement in manufacture had been in those cases where there was no direct retail connection.

The real clash between contractors and supply authorities was, of course, on the question of hiring-out apparatus at unremunerative rates, and on this point Mr. Hoadley said that it was essential to offer terms as favourable as those of the gas companies, and which would be acceptable to the consumer. Mr. Purse stressed the necessity for supply authorities to hire out equipment because it was impossible for contractors to undertake such business adequately, and, after all, why should the supply authorities provide everything for distribution and then stop short at the service cut-out? Was it not logical for them to give the whole service—within reason? He also reminded the conference that whereas the supply authorities were only free to deal with equipment within the limits of their own mains, the contractor could spread his business as he wished even to the extent of installing private plant.

Mr. Purse also reminded the conference that load development involved competition not only with gas but also with oil, and with oil cooking at that. Mr. H. J. GALLIERS (Brighton) claimed that the hiring out of apparatus had very little to do with supply progress. Municipalities had never progressed until they reduced the price of energy. A lower price still was wanted, and the supply authorities should see to this rather than to charge up to the "unit" losses incurred in other directions.

A few good hints to would-be load builders came from Mr. W. J. JONES (E.L.M.A.). He said that contractors had got the entry to houses where they had put in the original installation, but how often did they take advantage of that by follow-up calls? Similar criticism applied to those supply undertakings who only made contact with their consumers by way of the quarterly bill. Mr. Jones made a preliminary appeal for support of the E.D.A.-E.L.M.A. eyesight preservation campaign which is to be launched in the autumn.

The Business Sessions

The business side of the conference opened on Thursday morning by a civic welcome by Alderman A. Castle, Deputy-Mayor of Folkestone, who traced lighting developments from the candles of a few generations ago to modern lighting. The President, Mr. A. G. Bruty, then read his address (see our last issue, p. 39) which was followed by a vote of thanks proposed by Mr. T. E. Alger (Newport), who said that the prestige of the Association had been advanced considerably by the president's efforts during his year of office. In reply Mr. Bruty visualised the time when some of the younger members present would be presidents of an E.C.A. of not 1,500 members but of six or seven thousand members.

Mr. Penwill then read the first part of his paper, which was followed by a part of the discussion surveyed above, the second part of the paper being read and the discussion concluded in the Thursday afternoon session.

The annual general meeting was held on Friday morning, when Mr. Bruty presented his annual report, outlined below, and the business sessions were closed afterwards by votes of thanks to all who had contributed to the success of the conference. Mr. E. S. New (chairman B.E.A.M.A. Council) said that much of that success had been due to the president and Mrs. Bruty.

At the meeting of the Council of the three associations (E.C.A., N.E.C.T.A., Ltd., and the N.F.E.A.), Mr. H. M.

This is a hotel bus (not the Black Maria) which Messrs. E. E. Hoadley and J. W. Simpson (I.M.E.A.) are about to enter

Drake was elected president for the coming year and Mr. H. E. Walker (Birmingham) was elected vice-president.

In submitting his annual report the President extended the Association's congratulations to Mr. H. T. Young, a member

With the Contractors at Folkestone

1. Messrs. W. S. Taylor, R. Berry and H. H. Berry. 2. At the Mayor's reception: A group including Mr. A. B. Wildsmith, Mr. and Mrs. J. G. Briggs, Mr. and Mrs. C. Bates and Mr. W. T. Dean. 3. Mrs. H. F. Truman, Mr. H. C. Hazel, Mr. Truman and Mrs. Watts. 4. Messrs. W. I. Jones, A. Shelton and L. Mottram with their ladies. 5. The President, accompanied by Mrs. Bruty and Mr. H. M. Drake, greets Messrs. W. Riggs and A. H. Walton. 6. Mr. and Mrs. G. W. Thomson, Mr. and Mrs. J. W. Porter and Mr. and Mrs. F. C. Polden. 7. The Deputy-Mayor welcomes the delegates at the Leas Cliff Hall. 8. Messrs. T. C. Elliott, E. S. New (chairman of the B.E.A.M.A. Council), L. C. Penwill and R. G. Payne. 9. Three from the West: Messrs. W. B. Williams, F. Madge and T. E. Alger. 10. Messrs. H. T. Young (president-elect I.E.E.), V. W. Dale (E.D.A.), F. G. Arnott and F. L. Humber. 11. Mr. and Mrs. J. P. Loosemore, with Mr. A. P. Pope. 12. Messrs. J. G. Barnett, A. Gould and N. Aish

of the E.C.A., upon his election as President of the Institution of Electrical Engineers. Proceeding, he said that for the first time for many years the net addition to the membership had exceeded 100. New branches and sub-branches were formed for Colchester, East Anglia and Reading, bringing the total to 51 main branches and 21 sub-branches.

After referring to the general activities of the Council and

Tea-time at the garden party

Committees during the year, Mr. Bruty mentioned that evidence had been given before the McGowan Committee by Messrs. W. H. Walton and L. C. Penwill, and then said that the question of supply authority competition had received the constant attention of the Council. With a view to preparing the strongest possible case for presentation in the right quarters at the proper time certain vital information had had to be asked for from the membership. The response on the whole had been satisfactory, but it was a matter for regret that some members had not responded to the requests.

The scheme set up in conjunction with the Metropolitan Electric Supply Co. was operating most successfully and had resulted in a considerable extension of contractor activities in that company's area. On the other hand, the happy relations which existed in the S.W. & S. Company's area had ceased. Up to recently the contractors carried out all the hired wiring in the area, but the power company had now commenced a wiring department of its own.

The Association had been successful in securing modifications in the proposed new sub-contract conditions of the Air Ministry, and the " contractor group " had held a number of meetings and had submitted recommendations to the I.E.E. Wiring Rules Committee for incorporation in the eleventh edition of the Rules. The Phœnix Fire Insurance Co. had circulated with its renewal notes a memorandum on the subject of electrical risk, indicating that members of the Association were thoroughly competent to advise on all questions connected with electrical installations. During the year the wages position was stabilised.

A discussion on the " grid "—Messrs. W. J. Jones (E.L.M.A.), John Walsh, A. H. Walton, C. W. Sully (E.L.M.A.), W. Riggs and A. V. Milton

A number of conferences had been held with the National Register of Electrical Installation Contractors with a view to reaching a better understanding. The objects were to secure the position whereby the Register would confer a status of technical competence, while matters of trading, advertising, and negotiations with outside bodies would be kept strictly in the hands of the Association. To this end a Registration Committee of the Council was set up but its work has not yet been completed.

Referring to the issuance of the Fair Trading Policy, the President says that no praise could be too great for the patience and forbearance that has been exercised by the Association's representatives on the Fair Trading Council. It had taken nine years to arrive at this point and still the policy was only a code of trading practice to be followed by those desirous of putting the electrical trading of this country on a satisfactory basis. It was, however, within the power of the members of the E.C.A. to make the policy effective, and every effort should be directed by them to that end.

The question of national working rules had received attention, and progress had been made, but there was nothing to report at the moment. In conjunction with the E.T.U. interviews had taken place with the appropriate body with a view to legalising trade agreements in the electrical industry. No progress could be made at present as it was a matter of Government policy which had not yet been announced.

As a result of protracted negotiations a revised N.E.C.T.A./C.M.A. agreement had been entered into which was satisfactory and in the best interests of the members. As a result of indications that a wireless section would be of value, a

The silver salver presented to the President: Mr. W. R. Rawlings is seen with Mr. and Mrs. Bruty

new body known as the National Association of Radio Retailers had been formed under the auspices of N.E.C.T.A.; it was hoped that its activities would secure orderly trading in radio retailing.

The scheme for the inclusion of third-party insurance as part of the conditions of membership had been abandoned. The Electricity Commissioners' Supply Regulations had been considered by the Council, which had communicated its views on certain clauses to the Commissioners. Power had been given to the branches to enter into negotiations with regard to the payment of apprentices and boy labour, suggested arrangements being subject to consideration by the Council. It had also been decided that certain classes of unindentured boys should be eligible for certain of the apprenticeship awards.

The President concluded his report with an expression of thanks to his colleagues and the Director of the Association.

The Social Side

At the president's reception on Wednesday evening, the Mayor's reception and ball on Thursday evening, the garden party in the grounds of Port Lympne, the residence of Sir Philip Sassoon, on Friday afternoon, and at the smoking concert on Friday evening a spirit of goodwill prevailed. The Thursday evening event was generally acknowledged to be an exceptional success due, no doubt, to the ideal accommodation for such functions at the Leas Cliff Hall. The actual arrival at Port Lympne on Friday synchronised with a torrential downpour, but the spell of sunshine which rewarded a fifteen-minutes' patient wait in the coaches justified Mr. Penwill's assertion before lunch that an E.C.A. garden party could be nothing but a success.

Convincing the Farmer. By C. A. Cameron Brown

The headway that electricity has made in five years

UNDOUBTEDLY, one of the biggest advances during the past five years has been the improvement in rural tariffs, not only by reduction in amounts, but also in their attractiveness and appeal to the farmer. The recent reduction to a running charge of 1d. by a large rural supply undertaking now puts practically the whole country on a basis at which the use of electricity in liberal measure can be comfortably contemplated. There still remains some simplification of tariff form to be accomplished, and, for the companies not already there, a gradual approach to that ½d. level which represents a most satisfactory figure to the consumer.

As the tariffs have improved so has rural supply, both in respect of extent of lines and reliability of service. It required from the war until 1931 to reach something less than 10,000 farms supplied, whereas during the past five years the number has risen to the neighbourhood of 25,000. This may be taken as representing a high proportion of the farms easily supplied, and probably many future additions to the number will only be accomplished by more difficult and expensive means, calling for isolated lines and tapping points for single consumers. On the other hand, this difficulty is balanced by the increased desire on the part of supply undertakings to build up consumers and *load* rather than, as was painfully prevalent some years ago, being content with revenue only. The Dumfries-shire experiment typifies the modern tendency to "get electricity there."

In most of the individual applications of electricity to farming operations there has been an advance, but it is regrettable that electrical ploughing is no nearer practical application in this country. The somewhat pessimistic outlook expressed by me in 1931 has been in no way belied, and there does not appear to be a single set working in this country. Nor is there evidence that its application is spreading in France, nor that developments in Italy are without political direction. The truth is that electricity can offer British farming nothing which is an improvement on existing field power machines. There is no question, however, that were circumstances to alter and an opening for electrical ploughing gear to be offered, our manufacturers would rise to the occasion. There is, too, no question that Major Andrew McDowall is to be congratulated on his interesting experimental work on an electrical tractor which has produced a machine capable of doing work under practical conditions.

Small Power Applications

Electricity is at its best in the small-power applications on the farm, and no one use has appealed more to the farmer than water pumping. It is the coupling of quiet, unobtrusive pumping plant, with the possibility of automatic control, giving the advantages usual only with a mains supply, that gives electricity pride of place here. The development of the automatic pressure-tank system in small plants, practicable only with electricity and a development in this respect of the past five years, has given the farmer all the advantages of mains supply, since it offers a service of water at pressures not often obtainable from the gravity-tank system. There are now several makes of British plant of this type.

The application of motors to different machines has progressed in numbers, although there has been no outstanding technical development. It is, indeed, doubtful whether there has been any increase in the proportion of unit-drive machines, which may be technically preferable, but are so often ruled out on the ground of high cost. Some excellent transportable motors have been introduced during the period; one made on the drum principle has been awarded a silver medal by the R.A.S.E. The ubiquitous pneumatic tyre has shown its value in facilitating the handling of transportable motors, and its utilisation on a detachable undercarriage by the Shropshire,

Major Andrew MacDowall's experimental electric tractor

Worcestershire and Staffordshire Electric Power Co. has made the transport and manœuvring of a 15-h.p. motor by one man a very simple matter. It is, incidentally, quite illuminating to find that the former idea of applying transportability to the smaller motors only has been radically altered and that it often fits in better with farm practice to have the smaller motors fixed and the larger motors transportable. The smaller motors are usually wanted too often and for short periods so that transporting them becomes a nuisance, whereas the large grinding mill motor, for instance, is moved only once or twice for the required periods outdoors for silage blowing or for threshing.

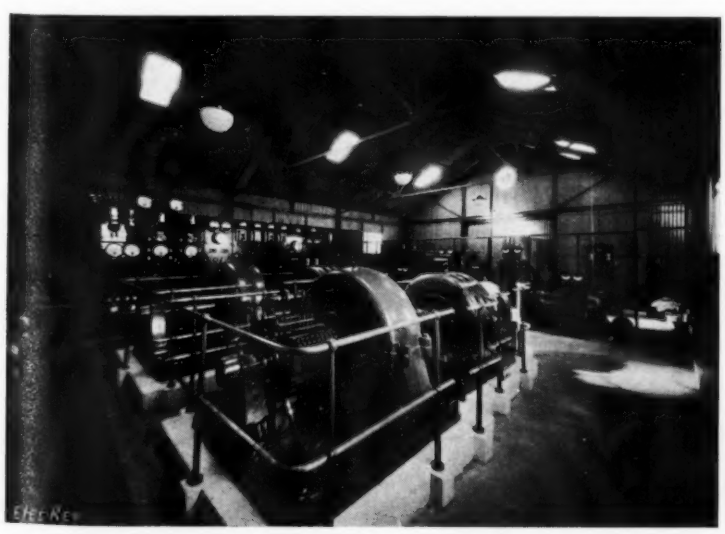
It is to be regretted that the tripod-mounted type of portable motor has apparently become neglected in this country. It showed such promise five years ago and the satisfaction it is giving to its users make it all the more surprising that it has not been exploited in this country with the attendant development in technique which a successful market would encourage.

Drying Grass Electrically

The period has seen the development to a successful stage of lucerne and short grass drying which offer very good loads to the rural supply company. The supply of heat for these driers is not practicable in competition with low grade fuel, but the power load is most attractive. A grass drying plant will run as long as from March to October for most of the time continuously and for the rest for long periods daily. The plant of British Crop Driers, Ltd., near King's Lynn, running continuously from May until October and absorbing some 300 kW, is an outstanding example of this class of load, while individual farms may have plants ranging down to 12 h.p. but with the same load characteristics.

At the moment the applications are being weighed in the balance, and while many farmers will in any case carry out drying, there are one or two points being cleared up which, if resulting satisfactorily, will induce many now undecided farmers to take up the process. The electrical industry would do well to see that when the step is taken it is so far as possible an electrical one. The industry should also watch the experiments in the eastern counties with potato drying stations.

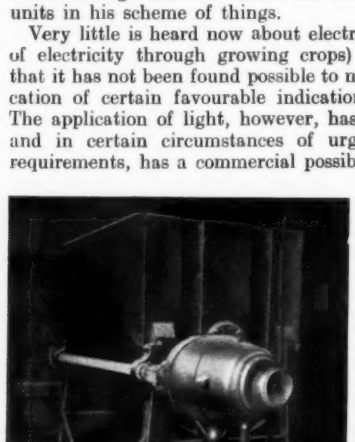
While soil heating by buried cable has not found any spectacular application during the past five years, sound technical progress has been made and whereas at the beginning of that period only one British firm was making any obvious effort to meet foreign competition, an attempt which has been most successful, there are now five British concerns making and



Motor generator and transformer sub-station of British Crop Driers, Ltd.

advertising this type of cable. That no commercial nursery or market garden has been equipped to any extent has been due partly to the difficulty in finding progressive nurserymen in an area of suitable tariffs. It is also partly due to the fundamental fact that this form of soil heating is best suited to the small man, to the man who carries out essentially high-grade propagation and raising and who appreciates the flexibility, control and cleanliness of the electrical method. The essential flexibility of the application has been enhanced by the production of low-loading cables fitted with built-in thermostats. These were doubtless developed for the amateur gardener, but they constitute a most valuable adjunct to the commercial grower who knows the value of small independent units in his scheme of things.

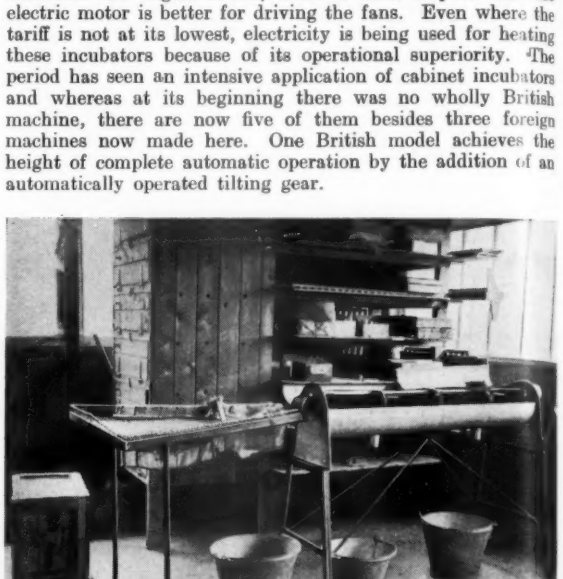
Very little is heard now about electro-culture (the discharge of electricity through growing crops) and we may conclude that it has not been found possible to make any practical application of certain favourable indications in small-scale work. The application of light, however, has had favourable results and in certain circumstances of urgency or for high-class requirements, has a commercial possibility.



A tripod-mounted portable motor driving a mixer

The use of power in the dairy is quite straightforward and calls for little comment except again to refer to the great advantage to dairy husbandry afforded by electrical pumping arrangements. The application of heat for sterilising has advanced and the past five years have seen the entry of a British made sterilising chest for the R.A.S.E. Silver Medal followed by lively development, so that several makes of chests and high-pressure boilers are now available. They all have the disadvantage of high cost per unit of heat electrically produced even at the lowest rural rate available, and have to fight their battle on other grounds than that of direct cost. That they do so successfully on the score of cleanliness, controllability and efficacy is evident from the numbers being installed even in areas with a running charge of 1½d. per kWh. The successful development of the electrically-heated steriliser is not being helped by the tendency of the dairyman to insist on the apparatus providing hot water as well as steam. Hot water is better produced by thermal-storage heaters at a low "unit" rate, leaving the steriliser to its own job of providing steam.

On the poultry farm electricity has made possible large-scale production of chicks, and although some models of cabinet incubator are engine-driven, there is little dispute that the electric motor is better for driving the fans. Even where the tariff is not at its lowest, electricity is being used for heating these incubators because of its operational superiority. The period has seen an intensive application of cabinet incubators and whereas at its beginning there was no wholly British machine, there are now five of them besides three foreign machines now made here. One British model achieves the height of complete automatic operation by the addition of an automatically operated tilting gear.



An electrically driven egg-washing machine

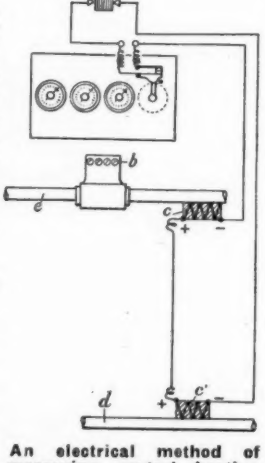
For small apparatus (egg-washing and grading, plucking and mixing) electricity has rapidly shown itself to be unsurpassed, but for the important purposes of heating incubators and hovers development has been held up by the comparatively high cost of electric heat. A good range of electrically heated hovers is now available and in wide use, but it is again the small man to whom these appeal, since he cannot afford the capital cost of large central heated oil-fired plant which gives very low running costs.

The last five years, then, may be regarded as a period of tariff reduction and technical consolidation with certain minor advances in technical application. Above all, it has seen a definite change of attitude between farmer and supplier. The former, on the whole, no longer looks with suspicion on the tentative advances of the supply authority's representative. The latter is realising that the farmer is not really so obstructively conservative as was at one time supposed, but that he must be convinced on logical grounds that the electrical proposition is sound.

The Measurement of Central Heating

THE measurement of the heat delivered to a building or apparatus heated by hot water can be effected by more or less complicated mechanical devices for determining the product of the quantity of water and its temperature drop, or by reference to the temperature difference between the heating surfaces and the surrounding air. A purely electrical method of measuring the heat delivered forms the subject of a communication from A. Egal and R. Chevalier to the Académie des Sciences.

Mathematically expressed, the problem is to integrate $(T-T')dQ$; where T and T' are the temperatures of the hot water at the consumer's "terminals" (flow and return connections) and dQ is the increment of water supplied between successive measurements of T and T'. Referring to the accompanying diagram, from *Génie Civil*, the thermo-couples c, c', in contact with the flow and return pipes e and d, are connected in opposition and therefore produce a net e.m.f. proportional to the temperature difference $(T-T')$.



An electrical method of measuring central heating supply

This is applied to a recording electric meter for a predetermined and constant number of seconds every time the water meter b completes an advance of 100 or 500 litres (22 or 110 gallons), or whatever other constant quantity of water may be chosen to represent dQ in the above expression. The reading of the meter is therefore proportional to $(T-T')dQ$, *i.e.*, to the total heat given over to the consumer between e and d. In a variation of the apparatus, due to Egal and Roche, the thermo-couples are used in conjunction with a small a.c. generator the rotating iron of which is driven by a water meter or by the flow of the water itself. The output of this generator is proportional to the water flow delivered, and it is passed through a metal rectifier to an electric meter which again is calibrated in thermal units.

Regulation of Distribution in Holland

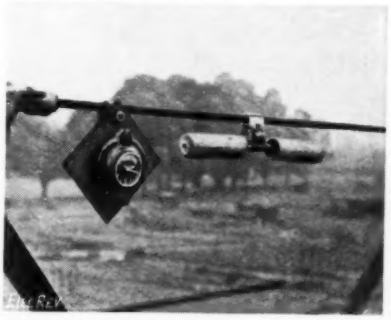
Addressing the assembly at the opening of a new electric power station at Nijmegen last week, the Netherlands Minister of Public Works announced that a Bill was being prepared relating to the regulation of electricity supplies generally, and providing for the interconnection of the supply systems on a national basis.

Overhead Line Construction. By J. S. Forrest

Recent developments in 11-kV and 33-kV practice

RECENT developments in overhead line construction have not been so far-reaching as in some other branches of electrical technique, such as in the design of switchgear and underground cables, in which developments of a fundamental nature involving radical constructional changes are continually being made. Nevertheless, although no sensational developments have taken place recently, steady progress is being made with the objects of decreasing cost and increasing reliability.

These two requirements are usually incompatible, and a suitable compromise must be made in designing a particular line. Cost can most easily be decreased by the use of long spans for which fewer supports and insulators are required and wayleave costs are less, which employ composite conductors or high-tensile strength alloys. The span lengths must, however, not be increased too greatly or trouble due to conductor whipping may be experienced and vibration troubles may be aggravated. Accordingly modern design tends to be fairly conservative and span lengths are not increased to their ultimate limit. In the following an account is given of some of the developments which have taken place in regard to conductors, supports and insulators.



Stockbridge damper and vibration recorder

Although copper conductors have the advantages that simple joints and clamps can be used and that corrosion or vibration troubles are seldom experienced, modern practice favours the use of conductor materials having a higher tensile strength. Moreover, in countries which are dependent on outside sources for their copper supply, the use of this material for electrical conductors is discouraged.

Steel-cored aluminium is the most widely used conductor material for voltages above 11 kV. It is quite satisfactory provided that, as with other composite conductors, well-designed joints and clamps are used and care is taken in their assembly. Nevertheless, as joints must always be regarded as potential sources of trouble, in modern erection practice their number is kept down to a minimum. When assembling cone-type joints and clamps, the use of grease enables a tighter joint to be obtained, with a consequent increase in conductivity.

Recently "segmental" and "lock-coil" steel-cored aluminium conductors have become available. The aluminium strands are shaped, giving the complete conductor a circular section, while it is claimed that the steel core is more efficiently protected than it is in ordinary conductors with circular-section strands. When the ordinary type of steel-cored aluminium conductor is used the steel core may be additionally protected by a coating of some bitumastic material. In conductors having only one layer of aluminium strands such protection is commonly employed.

Conductors of steel-cored copper have been used to some extent and seem to compare favourably with steel-cored aluminium. The use of copper alloys or aluminium alloys is increasing, and conductors of such materials have certain advantages over composite conductors. Cadmium copper (copper with 1 per cent. cadmium) which has been used in this country has a tensile strength of 150 per cent. and a conductivity of 85 per cent. of copper. On the Continent an aluminium alloy known as Aldrey (aluminium 98.7 per cent., silicon and magnesium 1 per cent., iron 0.3 per cent.) has been quite extensively used as a conductor material.

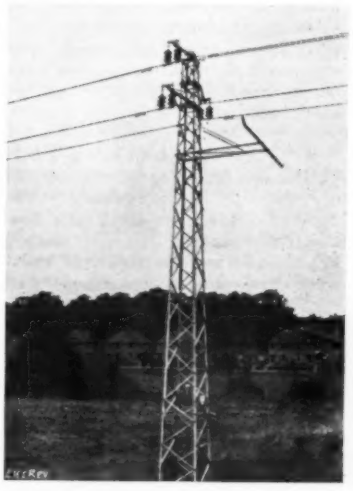
132-kV transposition tower working at 33 kV

Vibration and Whipping of Conductors

Conductor vibration usually occurs in a light wind, the vibrations having a frequency of the order of ten per second, and a maximum amplitude of about one inch. When a conductor vibrates, alternating stresses are superimposed on the steady stress, and fatigue fractures will occur if the total stress exceeds a certain value. The larger the steady stress, the smaller is the alternating stress which can safely be superimposed, so that vibration trouble is more liable to occur on lines on which the tension is high. Fatigue fractures usually occur at the mouths of the clamps where the alternating stresses are highest owing to the motion of the conductor being restrained by the clamp. The effects of vibration can be reduced by avoiding excessive tensions and by making use of light clamps having bell-shaped mouths. The vibration can be eliminated, or at least minimised, by installing dampers on the conductors. Various types of damper are available. The Stockbridge damper consists of a seven-strand steel cable attached to the conductor at its mid-point and having hollow cylindrical weights affixed to its extremities. Its total weight is about 10 lb. The damper is fixed to the conductor at a distance of about 3 ft. from the clamp. One damper is usually installed in each span, although two dampers per span may be used if vibration is severe.

A vibration recorder may be attached to the conductor. The recorder contains a pendulum which registers its movements on a chart driven by clockwork so that a record is obtained showing the times at which vibration has occurred. As vibration does not usually take place continuously and is usually more severe at night, its occurrence may easily escape notice unless some form of recorder is installed. The recorder also checks the effectiveness of the damper.

Whipping, which may occur during strong gusts of wind or owing to the sudden release of ice or snow load from a conductor gives rise to severe stresses on the conductors, insulators and supports. In addition, short circuits between phases or between phases and the earth wire may take place, causing the conductors to burn through and fall to the ground. There is no definite remedy for conductor whipping, but there are various palliatives to be applied when this trouble is experienced.



33-kV road crossing tower fitted with vibration dampers

Short span lengths should be used and light conductors should be avoided. The spacing between conductors and between conductors and earth wire should be large. Horizontal spacing is best, and when vertical spacing is used the conductors should not all lie in the same vertical plane.

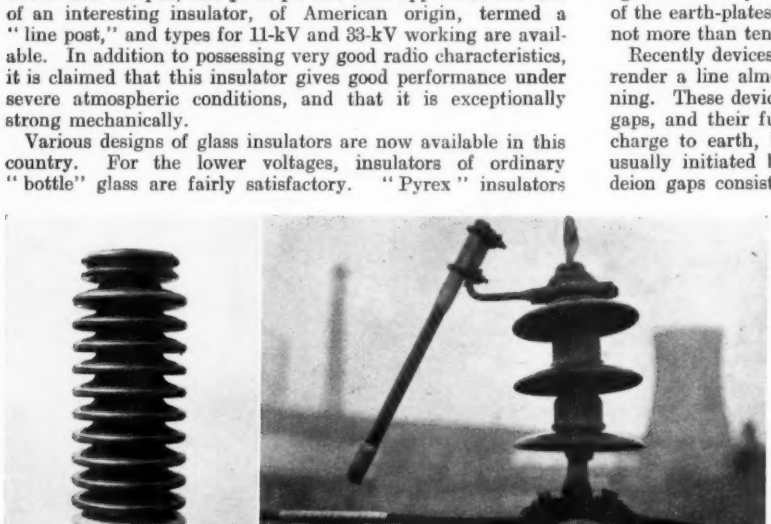
Supports and Insulators

Wood poles and steel towers are still the most favoured types of support. An American development is the skewed tower in which a diagonal of the tower cross-section is parallel to the line; this form of construction seems to have certain advantages from the mechanical point of view. Concrete poles are used to some extent in this country and should last almost indefinitely if properly manufactured. Light-steel sectional poles have been developed on the Continent and are now available in Britain. These poles are elliptical in section and are very strong for their weight. In areas where the load may increase rapidly it is fairly common practice nowadays to erect supports suitable for a higher voltage than that initially adopted. Thus, it may be expedient in some cases to erect a 33-kV line on towers suitable for 66 kV or even 132 kV.

Modern porcelain insulators are satisfactory as regards puncture strength, mechanical strength and resistance to temperature variations. Trouble is often experienced, however, due to fog in industrial districts and to salt near the coast. Insulators designed to overcome fog troubles usually have a large area of surface exposed to the cleaning action of wind and rain. Deep corrugations or sheds on the under surface are of no advantage, but under salt conditions they are beneficial.

Pin-type insulators are still mainly used on 11-kV lines except at tension points, but for 33-kV lines suspension-type units are commonly employed. While the former are cheaper they give rise to more radio interference than cap- and pin-suspension insulators. The radio interference is due to discharges between the conductor and the head of the insulator and between the pin and pin-hole. The intensity of these discharges can be lessened by reducing the capacitance between the conductor and the pin; this principle has been applied in the case of an interesting insulator, of American origin, termed a "line post," and types for 11-kV and 33-kV working are available. In addition to possessing very good radio characteristics, it is claimed that this insulator gives good performance under severe atmospheric conditions, and that it is exceptionally strong mechanically.

Various designs of glass insulators are now available in this country. For the lower voltages, insulators of ordinary "bottle" glass are fairly satisfactory. "Pyrex" insulators have good thermal characteristics but are more expensive. Insulators of toughened glass have recently been manufactured; this material resists mechanical shock to a remarkable extent and would seem to have a good future if such insulators could be produced more cheaply than the corresponding porcelain insulators.



Lapp line post insulator and (right) expulsion gap on 33-kV insulator string

Lightning Protection

Although lightning is not very severe in this country, it is responsible for approximately 20 per cent. of the total number of faults on 11-kV and 33-kV lines in general. Any effective means of lightning protection would therefore lead to a definite increase in overall reliability. Probably the best method of protecting overhead lines against lightning consists in the provision of an earth conductor above the phase conductors, bonded to earth at every pole or tower. It is desirable that the earth conductor should have a conductivity similar to that of the line conductor, although for economic reasons galvanised steel is often used. While an earth conductor does not render a line immune from lightning trouble it provides a certain measure of protection against direct strokes and approximately halves the magnitude of the voltages induced by adjacent discharges to earth. The resistance of the earth-plates at the tower or pole footings should be low, not more than ten ohms.

Recently devices have been developed in America which may render a line almost immune from interruption due to lightning. These devices are known as "expulsion" and "deion" gaps, and their function is to allow the over-voltages to discharge to earth, but to extinguish the power arc, which is usually initiated by the lightning discharge. Expulsion and deion gaps consist essentially of air gaps having a sparkover voltage of less than that of the line insulation. In order to interrupt the power current which (when the gap sparks over) would normally flow until the line was disconnected, one of the electrodes of the gap is confined in a narrow fibre tube. When discharge takes place a high pressure is developed in the tube and the power arc is extinguished after about one cycle. It is necessary to use a gap designed to operate on the earth fault current of the system. If the earth fault current is too small the discharge will not be extinguished, while if it is too large the tube may be damaged. In order to obtain maximum immunity from interruption, gaps should be installed at every line insulator, but a certain amount of protection is obtained when they are provided at less frequent intervals along the line. The expulsion gap illustrated has an external air gap of 2 in., while the length of the air gap inside the tube is 8 in.

Another American development is the use of the insulating properties of wooden poles and cross arms, suitably protected by spark gaps, to decrease the vulnerability of the line to lightning. On systems suitable for operation with an insulated neutral, the use of Petersen coils should prevent earth faults due to lightning discharges from giving rise to line interruptions. When the lightning has discharged across the insulators the power-charging current, which would tend to follow the lightning discharge, is limited by the Petersen coil to a value which is insufficient to maintain an arc. Petersen coils are widely used in Germany, and in recent years several installations have been put into service in this country and in the United States.

Low-voltage Distribution Systems. By C. J. O. Garrard

The effect on their design of limitations to circuit-breaker capacity

AT the present time two tendencies are operating to make the design of low-voltage distribution systems and of ancillary apparatus more difficult. The first is the increasing size of the systems, due in the case of supply undertakings to the growth of load on the one hand and the desire to obtain greater efficiency and reliability by the interconnection of sub-stations and distribution networks on the other, and in the case of private industrial plants to the development of industrial electrification and the extension of factories.

The second is the increasing extent to which distribution systems are either fed exclusively from, or at any rate tied in to, high-voltage systems of large capacity.

Both these tendencies result in an increase in the short-circuit power which can be fed into a fault and necessitate a corresponding increase in the breaking capacity of the switchgear and in the short-time current rating of all apparatus and cables. The degree to which breaking capacity and short-time current rating of low-voltage (660 V and less) circuit-breakers and apparatus can be increased is, however, severely limited both by practical and economic considerations. The limit is much lower than is generally realised by many consumers and suppliers of electricity, not to mention certain switchgear manufacturers.

Voltage and Breaking Capacity

Breaking capacity is limited by: (a) ability to quench the arc between the parted contacts and to restore to the gap between them sufficient dielectric strength to prevent the arc being restruck by the recovery voltage; (b) ability of the tank or container to withstand the internal pressure generated on operation under short-circuit; and (c) ability of the current-carrying parts, insulators and circuit-breaker mechanism to withstand the heating and electromagnetic forces due to the short-circuit current.

As regards limitations (a) and (b), the duty of a circuit-breaker increases in severity directly as the voltage, so that for low voltages little difficulty is experienced in quenching the arc or in designing a sufficiently strong tank. The heating and electromagnetic forces, however, increase as the square of the current, which, for a given short-circuit power, increases in proportion to reduction in voltage. It follows that the mechanical stresses on a circuit-breaker increase inversely as the square of the voltage, and for this reason it is generally the mechanical strength of a circuit-breaker that limits its breaking capacity below 1,000 V.

The severity of the limitation due to the electromagnetic forces is increased by the necessity of constructing circuit-breakers to withstand the forces due to the peak-making current, which may be much greater than the peak value of the steady short-circuit current. If, for instance, a circuit-breaker is used on a three-phase system, the short-circuit power of which is B kVA and the voltage V, the r.m.s. breaking current is $\frac{1{,}000.B}{\sqrt{3}.V}$ amps. The peak value of this current is $\frac{\sqrt{2}.B.1{,}000}{\sqrt{3}.V}$ amps.

If now this circuit-breaker is closed on to an existing short-

circuit, owing to the "doubling effect" (or d.c. component of the short-circuit current), the maximum peak value of current that may occur at the instant of closing the circuit is $1.8\times\sqrt{2}\times\frac{1{,}000.B}{\sqrt{3}.V}=2.55\times\frac{1{,}000.B}{\sqrt{3}.V}$. The mechanical forces due to this current are $(1.8)^2$ or $3\frac{1}{4}$ times as great as those due to the peak value of the breaking current calculated above.

So long as a circuit-breaker is liable to be closed upon an existing short-circuit it is absolutely essential that it should be able to withstand the peak current of $\frac{2.55\times1{,}000.B}{\sqrt{3}.V}$, that is, $2\frac{1}{2}$ times the r.m.s. value of the breaking current. Otherwise the breaker is a potential source of danger to the installation and also to attendants.

The effect of such limitations as these are summarised by means of the accompanying curve connecting the breaking capacity and the breaking-capacity current with the system voltage. From zero up to a certain voltage (say E) the breaking capacity is limited by the maximum permissible breaking-capacity current, so that the breaking capacity rises from zero to a maximum at E, which is the figure usually quoted as the normal capacity of the breaker designed for that voltage.

As the voltage is increased above E the limitation to the breaking capacity is the efficiency of the arc-quenching device or medium, and it is found that the breaking-capacity current must be decreased in the same proportion as the voltage is increased in order not to risk failure of the breaker. The result is that the breaking capacity remains sensibly constant. The maximum voltage for which the breaker may be used is limited by the clearances to earth and the dimensions of the insulators, as well as by the efficiency of the arc quenching.

Practical Limits to Breaking Capacity

Experience shows that the limiting making current for which low-voltage circuit-breakers can be constructed economically lies in the neighbourhood of 100,000 A or slightly more. This corresponds to a breaking capacity of about 50,000 kVA at 660 V. In order to achieve this capacity a really sound and substantial construction is necessary, and, if cheapness is the principal criterion, then 25,000 kVA at 660 V is a more practicable limit. It is very desirable that the limit of 50,000 kVA at 660 V should be incorporated in the forthcoming new edition of the B.S. Specification for circuit-breakers.

Too little attention is commonly paid to the mechanical and thermal strength of apparatus other than circuit-breakers, such as current transformers, cable boxes, direct-connected ammeters, and busbars and connections. Switchgear of high breaking capacity is useless if the auxiliary apparatus is insufficiently robust. It is also essential that the section of the cables should be sufficient to carry the short-circuit current for a long enough time for the breakers to trip. Too often the cable sizes given in specifications are such that if the specified short-circuit current really did occur the cables would be vaporised. As a guide to the maximum short-time current-carrying capacity of copper conductors, the following current densities may be used :—

Duration of short circuit. sec.	Current density, A/sq.in.
0.25	210,000
0.5	150,000
1.0	106,000
2.0	75,000
5.0	48,000
10.0	33,000

The calculation of the mechanical strength of the conductors is more complicated, but is of great importance in the case of current transformers, which are liable to be burst by the repulsion between neighbouring parts of the winding which carry currents in opposite directions.

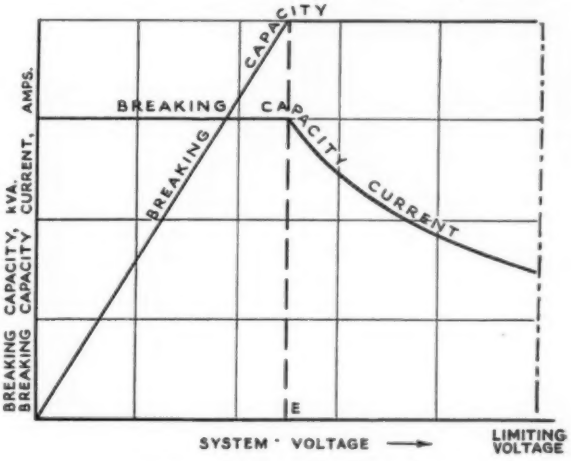
It is evident from the above that the first thing to consider in laying out low-voltage installations is the short-circuit power to be reckoned with and the breaking capacity of the available circuit-breakers. It is most important to calculate carefully the short-circuit power of the network, as in many cases estimates of its value are found to be considerably exaggerated. The common practice of calculating the short-circuit capacity solely with reference to the capacity and the leakage reactance of the step-down transformers is often insufficiently accurate. The impedance of the cables and also of any step-up or coupling transformers between the low-voltage network and the generating station should also be included.

Again, many buyers do not base their specifications upon accurate calculations of short-circuit power at all, but merely specify, say, 50,000 kVA or 100,000 kVA because it is a round figure, and because they think that if they specify such a breaking capacity the manufacturer will supply them with more or less what they really need. It is very important to discover the real situation to avid unnecessary expense.

If after examination of the proposed layout it is found that circuit-breakers of sufficiently large capacity are not available resort must be had to means of reducing the short-circuit power. This may be done either by increasing the impedance of the system by installing choke coils or high-reactance transformers, or by sectionalising it and thus reducing the total capacity of the plant connected to each section. There is little doubt that where it is possible much the best policy is to split up the system to an extent sufficient to ensure that the short-circuit power on each section is not greater than the capacity of the circuit-breakers.

Choke coils, while they are very useful for use on high-voltage feeders and in the form of tie-bar reactors in power-station switchboards, are less desirable in low-voltage installations. They are expensive and for heavy currents somewhat bulky, and have a bad effect upon regulation and power factor.

A further disadvantage of choke coils and high-reactance transformers is that if a given short-circuit power is not to be exceeded the reactance of all the supply circuits must be increased each time the connected capacity is added to, so that while in the initial stages a given installation may be made quite satisfactory by adding reactance, as its size is increased a point is sooner or later reached at which subdivision is necessary. It is therefore generally more economical to begin with a proper system of sectionalisation, which may be extended at will, without modification of existing gear.



Breaking capacity and system voltage

Points to which attention must be paid are the question of spare transformers and alternators and the possibility of joining up one or more sections of busbar in case of emergency or at times of light load. Precautions must be taken (if necessary, mechanical interlocks may be provided) to ensure that in no case is too great a total capacity of generating plant or transformers connected to any section of busbars.

"Back-up" Protection

It is often proposed that circuit-breakers of insufficient breaking capacity for the systems upon which they are used should be "backed-up" by some form of protection. The suggestion is that such circuit-breakers should be fed from an auxiliary busbar which itself is supplied through a set of high-breaking-capacity fuses or a circuit-breaker with an instantaneous trip. The individual breakers would then deal with overloads upon the separate circuits, while the fuses or the common circuit-breaker would clear short-circuit faults before the overload releases on the individual circuit-breakers had time to act.

It is very doubtful whether such schemes are sound or even practicable, except where the total full-load current of each group of circuit-breakers to be backed-up does not exceed about 50 A. High-breaking-capacity fuses are alone suitable for this purpose on account of their quick action. Circuit-breakers cannot be made rapid enough in action to protect the backed-up breakers against the peak-making current which flows when the circuit is closed upon an existing fault.

High-breaking-capacity fuses are useful, however, as a protection for starters or for circuit-breakers used as starters connected to supply networks of large short-circuit power.

Although fuses may not completely prevent damage to a starter that is closed upon an existing short-circuit, they will prevent its complete destruction and confine the damage to burning of the contacts. An advantage of fuses for this purpose is that their breaking capacity does not decrease with the normal current in the same way as does that of a circuit-breaker. The reason for this is that fuses of small current rating interrupt the circuit before the short-circuit current has had time to rise to the maximum of the first half-wave.

Does Supply History Repeat Itself? By Cincinnatus

Public utilities of the sixteenth century

IT is surprising how old are some of our "modern" ideas. For instance, an interesting survey, "Town Government in the Sixteenth Century," by Mr. J. H. Thomas, of Oxford University, helps us to see that municipal trading extended in the sixteenth century, even to providing goods for poor people, and to supplying traders with capital for trading purposes. Those were the days when Liverpool was a village of 750 inhabitants; Leicester 4,000; Cambridge 6,500; Coventry 6,600; and Norwich, one of the largest cities in England, had 17,000 people.

The mainstay of all lighting systems was the tallow candle, and local authorities were greatly concerned to secure a full supply in store to cope with "maximum demands." At Ipswich, any butcher who sold tallow against regulations was fined £2 and a chandler was fined £5, these figures approximating to £24 and £60 of money to-day. At Gloucester, a butcher who sold tallow to people living outside the town area lost his citizen's rights.

Tariff Fixing

Monopoly conditions were exploited, and chandlers had control of a commodity for which there was a general scarcity. At Chester, now noted for rural pioneering works, a price was fixed at which candles were to be exchanged for other commodities. Price regulation became an intricate business, and the chandlers of Chester were summoned before the Mayor (there being no Candle Commissioners) "for breaking the Assize . . . . in spite of being bound." They had charged higher prices than the statute price and had failed to supply sufficient candles for the requirements of the citizens, *i.e.*, inadequate generating capacity, and high-priced units.

Naturally, the chandlers blamed the general rise in the price of tallow for the position, since prices of candles had been fixed by the "Assize" when tallow was cheaper and there was no equivalent of to-day's "coal clause." In fact, the citizens of Chester were buying their candles inside the town at 3d. a pound and selling them to those outside the city walls at 3½d. a pound! The upshot of this trouble was a new price of 3½d. per pound, a historic precedent for judgments in favour of undertakings. One notes, however, that the Nottingham chandlers were fined "for combining to keep up the price of candles." Here is a precedent that has not been followed up in relation to undertakings who maintain high tariffs and high dividends.

Private plant was not entirely suppressed in this period, since, for example, although the Coventry chandlers had a monopoly, householders could make candles for their own use. The authorities were enterprising here and the Council startled the monopolists in 1523 by giving to people who were not chandlers the exclusive right to supply the town with candles. Ric Nicklyn and Jas Hobson, butchers, took upon themselves with others "to be bound to the Mayor of the City to secure and find all the city sufficient candles at the price of 1½d. a pound at thirteen pounds to the dozen for the space of seven years next ensuing . . . ." Company undertakings will note with satisfaction that this long period contract to private enterprise seems to have worked well; after it had lapsed, inspectors were appointed by the Mayor to enter any candle producer's establishment and test the weight of the candles.

Seasonal Charges

However, the local authorities led the way in the ordering and control of this lighting equipment and production, and the Mayor of Salisbury set out to establish a candle producing scheme of his own. He closed down the private "plant" (one man and one woman chandler) and undertook to produce candles for 1d. a pound during summer and 1½d. in winter, anticipating the two part tariff experts of 1936 who differentiate between summer and winter charges. However, in addition, he offered to give thirteen pounds to the dozen, and one still awaits the supply engineer who is sufficiently enterprising to give us 13 kWh for the price of 12 as a sort of consumers' bonus!

This Mayor kept strict accounts, and having made a practical demonstration that he could provide both Salisbury and its environs adequately with moderate-priced candles, he handed over his "plant" to the two dispossessed chandlers and told them to do the job properly. However, some years later, the local authority had to take over again (cheers from the I.M.E.A.!) Similarly, in Ipswich, the local authority, after laying down a system of control and imposing fines and forfeits on those who broke the rules and regulations, was forced to enter into the business itself and provide candles for the people.

Apart from the candle, the two sources of fuel for heating and cooking were wood and coal, and towards the middle of the 16th century wood became scarce and local authorities began to take steps to preserve the trees. The iron and glass works in Sussex were taking toll of the forests, and the increasing scarcity led to a demand for coal, so that "a multitude of chimneys arose," according to William Harrison, the Elizabethan chronicler, in "Elizabethan England," and he adds: "As for stoves, we have hitherto not used them greatly, yet do they now begin to be made in divers houses of the gentry and wealthy citizens, who build them not to work and feed in, as in Germany and elsewhere, but now and then to sweat in, as occasion and need shall require it."

Harrison is a homely chronicler; he refers a little critically to the nobility "Whose cookes are for the most part, musicall-headed Frenchmen and strangers," but he throws light on the customs of certain modern business men in a devastating passage: "For the nobility, gentlemen, and merchantmen, especially at great meetings, do sit commonly till two or three of the clock at afternoon, so that with many it is a hard matter to rise from the table." However, so far as the actual cooking was concerned, it appears that "Each one made his fire against a reredos in the hall, where he dined and dressed his meat." As to-day, coal was brought from Newcastle to many towns, and Chester started a scheme of supply by making a loan to a private citizen to commence business as a coal merchant, provided that the Corporation should fix the price of coal!

Peak Load Problem

One very interesting aspect of the period was the water supply. Towns such as Northampton were advanced in their ideas, maintaining conduits with taps at various points in the town. It is recorded that during the very dry summer of 1608, a restricted supply system was put into force, the supply being cut off during the hours from 10 a.m. to 2 p.m. and 7 p.m. to 6 a.m. Evidently the peak load problem is an old one.

It is worth recording, too, in order that our modern ideas may be suitably put in their place, that Francis Bacon mentions in his "Apothegms" an anecdote about his father: "When Sir Nicholas Bacon, the Lord Keeper, lived *every room* in Gorhambury was served with a pipe of water from the ponds, distant about a mile off." When the flow of water ceased Francis built Verulam House near the pond-yard, saying that since he could not carry the water to his house he would carry his house to the water!

Municipal control of water supply has a long tradition, and both Norwich and Ipswich were pioneering actively and meeting some of our own difficulties. A waterworks engineer was appointed at Norwich in 1623, and the Council had to make arrangements for rights to invade private property so as to replace water-pipes. This has a modern ring about it, and so have the threats of the authorities to cut off the water supply from those delinquents who had failed to pay their water charges. Then followed another innovation, reminiscent of the early days of the electricity supply industry, when the Council secured the rights "to break up three feet in breadth into the ways and streets of this town for laying of pipes and amending them."

However, as to-day, the control of public utilities was in both private and local authority hands, depending upon all sorts of factors; and apparently no one had any special theories about it, which must have been very refreshing. Evidently many of our public utility problems are not new in essence, although different in detail, and it is remarkable how enterprising the local authorities of Great Britain were in those far-off days. The sixteenth century is an interesting period to electricity supply executives, and there is much of special interest about the life of the people in "Town Government in the Sixteenth Century" and in that homely old classic, "Elizabethan England."

Insulating Slabs for Switchgear

The British Standard Specification for slate slabs for switchgear has been revised and extended so as to cover both slate and marble slabs for switchgear up to 660 V a.c. and d.c. This revision is the first step towards the preparation of specifications covering switchgear bases of materials other than slate. An insulation resistance test has been added, the resistance figure being graded according to the thickness of the slab. Other clauses deal with finish, dimensions, tolerances, bevel and corrosion of metal. Two alternative methods of testing for insulation resistance are described in an appendix. Copies of this revised specification (B.S.S. No. 160-1936) may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

A 220-kV Cable Installation

Link between Paris and power plant on the River Rhine

ONE of the most important line construction works to be completed in France for some time past is the new circuit between the hydro-electric plant on the banks of the River Rhine at Kembs, and Paris. The section between Villevaude and the terminus at the Saint Denis power plant, a distance of about 30 km, formed the last stage.

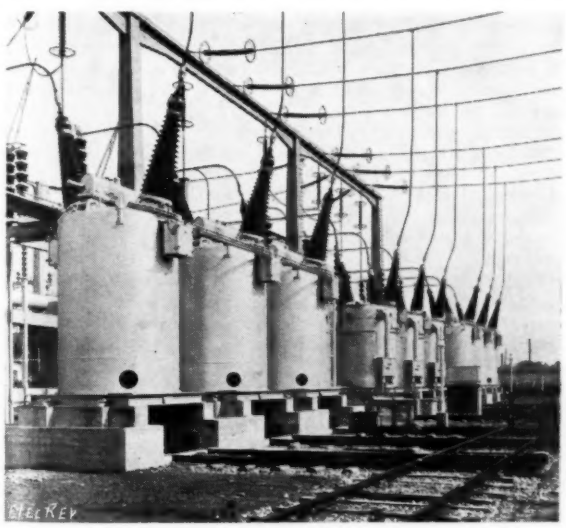
From Villevaude to Clichy-sous-Bois (about 10 km.) there is ordinary overhead construction for 220 kV on steel pylons with an average span of 320 m., the longest span being 460 m. and the shortest 150 m. The conductors have thirty strands of aluminium and seven of steel, with a total cross sectional area of 400 sq. mm. They are strung from suspension insulators in chains of sixteen elements, single chains being used ordinarily and double chains where the strain is great and on anchor pylons.

The Villevaude sub-station is eventually to become a distribution centre. It has a simple system of bus-bars at 220 kV, to which the lines are connected by means of oil and disconnecting switches so arranged that when they are open the lines which they control are automatically earthed. The whole of the station was built by Alsthom.

The terminus of the overhead section at Clichy-sous-Bois is similar, but the connection to the Saint Denis underground cable is made by air-break section isolators without any oil switches; the cable potheads are 13 ft. above ground level. These cables, which have been built for a higher voltage than has ever before been used underground, are of the Pirelli oil circulation type. The line consists of three single conductor cables laid together in a concrete trough covered with concrete slabs.

Cable Construction

The cable has a central duct of 13 mm. formed of a spiral of steel ribbon 0.6 mm. thick. Over this are laid the strands of copper wire which make up the conductor. These are 2.3 mm. in diameter and number eighty-three, providing a total cross sectional area of copper of 350 sq. mm. The insulation consists of four layers of oil impregnated paper. The thickness

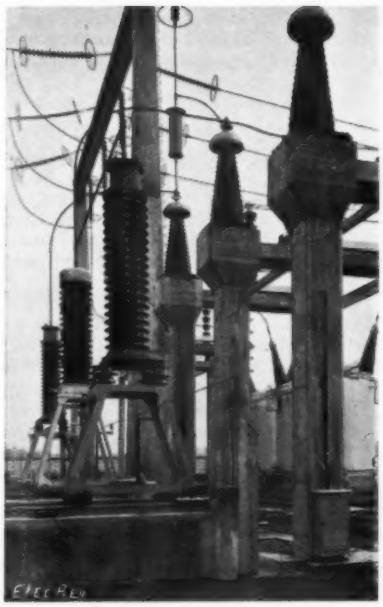


Oil switches at St. Denis

of the paper used increases towards the outside, the inner layer being 0.08 mm., the second 0.10 mm., the third 0.12 mm., and the outer one 0.15 mm. Over this insulation is laid a first lead sheath of 3.2 mm. thickness protected by an armour of brass ribbon 1 mm. thick, which is covered by a second lead sheath of 2.5 mm., while the outer covering of jute impregnated with tar brings the total diameter of the cable to 97 mm. In order to avoid any potential difference between the two lead sheaths they are soldered together at each junction, although they are connected throughout their length by the brass ribbon which makes contact with both sheaths.

Built for 220 kV, the cable will carry a nominal 420 A, corresponding to 160,000 kVA. It is in lengths of 200 metres joined together either by ordinary or by sectionalising joints. In the ordinary joints the oil circulation through the central duct is not interrupted, but in the sectionalising joints the oil is stopped and new circulation takes place on the other side.

In the making of the ordinary joints the internal steel spiral is removed for a short distance, pieces of steel tube being inserted in its place. This serves to reinforce the end of the oilduct. The tubes are placed together and a steel collar is slipped over the the two ends of the cable and clamped on by a small hydraulic press; a layer of varnished cambric over the collar provides a sufficiently oil-tight joint.



220-kV cable potheads and condensers in the Paris-St. Denis circuit

The paper insulation having been cut away in stepped-off sections, the insulation is replaced over the joint, using paper ribbon 5 to 20 mm. wide impregnated with oil. Over these paper collars are slipped and the insulation finished off in the form of a series of cones designed so as to use the least possible amount of paper and still hold the parts in position and give adequate insulation.

Over the end cones a layer of 2 mm. lead wire is laid, forming a continuation of the lead sheath. The whole joint is completed by a copper sleeve slipped over the whole of the joint and soldered to the inner as well as to the outer lead sheath. Thorough impregnation is obtained by heating the joint in a vacuum while the oil circulation in the central duct is kept at a pressure above normal.

The sectionalising joints comprise three distinct parts. First, each end of cable is fixed into a pothead, and then the upper ends of the two potheads are joined together, the whole being enclosed in an oil-filled sleeve. The porcelain potheads are sealed on to sockets provided with a conical prolongation which forms a deflector and runs to the outer wall of the finished joint. The two ends of the two potheads are provided with a flexible junction so that they may move slightly in the joint in case of expansion, and the joint is covered with a copper screen.

The whole of the parts are then covered with paper insulating tape and enclosed in a tinned copper sleeve fastened to the deflectors. This pothead assembly was completed in the factory, so that for installation it was only necessary to remove the lead sheathing for a certain distance and to cut off the insulation in steps. Further insulation was then added to give the cable a general conical form to fit inside the potheads, the section projecting out of the pothead being also wound down conical and covered with a layer of lead wire. The connection to the potheads is through a special cap on the end of the conductor that fits into the contact on the pothead. The ends have then only to be closed with caps and impregnation by heating carried out.

Maintaining the Oil Pressure

Each of the twelve sections of the cable is provided with pressure reservoirs containing oil intended to take up the variations in the volume of oil in the cable. These are composed of cylinders partly filled by cells containing air, the oil occupying the space around and between the cells. These reservoirs are placed in manholes under the cable. The manholes are built with the cables lying in specially constructed ducts on the roof of the manhole. On account of the size of the joints the manholes are exceptionally large, being 7.80 metres long and 2.40 metres wide.

At the Saint Denis end of the line in a sub-station built to receive the cable are two sets of three single-phase 220/60/11.5 kV transformers rated at 75,000 kW with cos. $\phi = 0.85$. The windings are rated at 91,500 kVA primary, 88,200 kVA secondary, and 48,000 kVA tertiary. The regulation coils can be operated under full load and permit variations of the voltage of 0, ±2.5 per cent., ±5 per cent., and ±7.5 per cent.

The two transformers were built by Alsthom and Jeumont, that of the former weighing 158 tons per single phase element and in the case of the latter, 150 tons. Of these weights 55 and 50 tons respectively represent oil. Under test the iron

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

The McGowan Report

Mr. A. J. Hutchinson's reply to "Gassed" last week seems sadly out of tune having regard to the meaning of the McGowan Report to which he refers. Gilbert and Sullivan had nothing on the authors of that Report even when they produced "The Mikado." In both cases the prisoners are found innocent but due for execution just the same, according to law.

It hardly seems possible to misunderstand the aim of the Report. Less than 10,000,000 kWh per annum and execution is recommended for the common good, no matter whether one is a drone or a busy bee. Above 10,000,000 kWh per annum and the sex doesn't matter; things are sure to come out right.

That the extermination of authorities selling less than 10,000,000 kWh per annum will lead to greater economies and efficiencies seems a very elastic sort of theory; it can be stretched to suit any particular group of figures or undertakings. By the same rule, outputs of 10,000,000 kWh must make a poor showing when compared with outputs ranging between, say, 20 and 100 million kWh per annum.

The results of working, however, do not bear out such a theory. Had the recommendations been based on a comparison between a desired standard of efficiency and the results obtained by the smaller undertakings—and also the larger—supported by proofs, many of the smaller undertakings would have scored heavily. Size is no criterion of efficient working or economic administration. Having regard to the nature of the recommendations, however, the suggestion that they are to secure national well-being is mere eye-wash. Fortunately, the principle is altogether contrary to established ideas of British justice, and as the crowd generally expects to see fair play, the opposition to the major recommendation is likely to prove overwhelming.

It is interesting to read that Mr. Hutchinson is satisfied that the Council of the I.M.E.A. has always acted in the best interests of the small as well as the large undertakings because there must be many ordinary members of that body who now feel that the "little 'uns" have been let down very badly, seeing that the recommendations aim at the annihilation of roughly two-thirds of the existing undertakings and the annexation of their territories by the remaining one-third. Although Mr. Hutchinson does not seem to like the idea, if the recommendations were adopted, the Council of the I.M.E.A. would have good reason to look more prosperous than ever at the next Convention. Look at the meals the small undertakings will provide!

His final advice would have been very valuable if offered a year or so ago, when ordinary members were in the dark regarding the Council's sanction to undefined proposals to reduce the number of supply undertakings. No doubt when the evidence which the Council laid before the McGowan Committee is released to members, it will provide some clues leading up to a solution of the cross-word puzzle presented in this Report.

JAMES RATCLIFFE,
Engineer and Manager.

Whitworth, *July 11th.*

Is A.c. Dangerous?

I agree with Mr. B. C. Chatterjee regarding the risks attaching to the use of a.c. at 230 V for domestic purposes, especially in surroundings where good earth conditions obtain. This is not, however, due to ignorance of the properties and character of the current on the part of the user, for few people would knowingly take a shock from even 230 V d.c. mains. It is chiefly due to the use of appliances, supposedly safe for the voltage for which they are supplied, but which are not designed and made on sound principles.

Of course, as Mr. Chatterjee suggests, the a.c. supply could be at 100 V. In spite of other advantages that this voltage brings, such as more efficient and less brittle lamps, the losses due to distribution are of much greater magnitude, the proportional loss at 100 V being four times that at 230 V. Individual transformers could be installed for supplying each house or very small area, but the initial cost of these is high, and the losses involved therein may amount to those with 100 V distribution.

The risk of shocks could be overcome in a more practical manner by devising a standard to which all apparatus as well as installations should conform (perhaps the I.E.E. Regulations modified if necessary) and compelling their observance. This would tend not only to render shocks less dangerous but to prevent them altogether.

J. N. BARNETT.

Oundle, *July 11th.*

Safety in the Home

My thanks are due to Mr. Moore for his letter in your last issue; nevertheless, at the risk of appearing ungrateful, I must still confess to a good deal of doubt as to the correct solution of this knotty problem. I have discussed the matter of earthing with engineers of undoubted repute and, unfortunately for my peace of mind, have found considerable divergence of opinion constituting, roughly, four schools of thought and these I venture to set down as follows:—

1. The I.E.E. latest edition enthusiasts.
2. Those who follow the latest edition as regards the provision of three-pin plugs but recommend earthing the third socket in dangerous situations only.
3. Those in favour of two-pin plugs everywhere except in dangerous situations, interchangeability being effected where desired by the provision of spare flexibles and connectors.
4. Those who recommend two-pin plugs and sockets everywhere.

This final group has, I am told, an extensive following who confess to a complete distrust in earthing by means of three-core flexibles, because, (a) there is no indication when the third conductor breaks, a contingency which must happen frequently, and (b) certain apparatus such as metal-cased radiators, irons, vacuum cleaners, &c., may be more dangerous to handle when earthed than otherwise. These two-pin devotees are of the opinion that no portable electrical apparatus should be permitted in really dangerous situations, such as bathrooms; such apparatus as is necessary must be securely fixed and earthed solidly.

I am sorry to write at such length on this matter, but as an excuse for my pertinacity I would point out that the majority of our students at the completion of their training may be interviewed by prospective employers holding one of these four opinions. If we teach them only the I.E.E. earthing regulations they will certainly be nonplussed in a great many instances.

Shall we never arrive at the happy state when the majority of engineers are in agreement on this matter? Mr. Moore evidently thinks otherwise, because, in his last paragraph, he threatens yet another edition of the I.E.E. Rules in which "we," I presume Mr. Moore and others, will render safe apparatus which, for years, has been considered quite suitable for use in the home.

HELEN MINOPRIO, *Principal,*
London School of Electrical Domestic Science.

London, S.W.3, *July 13th.*

With reference to Miss Minoprio's letter in your issue of July 3rd, examples of accidents will show how one incurs risk of shock:—

(a) Using appliances on stone, tiled or concrete floors or on the ground.

Example 1. Man using a cleaner on car. Two-pin plug; circuit complete from cleaner frame to ground.

A 220-kV Cable Installation (*Continued from previous page*)

core losses were 106 and 99 kW, respectively, while losses in the copper windings were 140 and 154 kW. The temperature of the oil under normal operating conditions is about 90 deg. C. and that of the windings is 100 deg. C. The transformers are built to stand overloads of 10 per cent for two hours, 25 per cent. for one hour, 50 per cent. for twenty minutes and 100 per cent. for two minutes.

The ten reactance coils were built by Alsthom. Their capacity per unit is 10,000 kVA, and they are connected in star, with the neutral brought out. They are designed for 11,000 V, but will withstand 12,100 V for two hours or 15,000 V for one minute. At 75 deg. C. they represent a loss of 60 kW in the three phases. The weight of each coil, including oil, is 24 tons. The connection of these transformers and cables to the bus-bars is through nine oil and section switches.

The oil switches are built for 220 kV ± 10 per cent., and carry 600 A. They will, however, withstand 40,000 A for one second or 20,000 A for five seconds. Their rupturing capacity is 2,500,000 kVA. The set built by Alsthom weighs 99,400 k.g., and that by Jeumont only 80,000 k.g. The control of all the oil-switches is electro-pneumatic. The air-break switches controlling the reactances are designed for 600 A at 11 kV.

The completion of this important work means that Paris has now another source of supply from the eastern region of France.

Example 2. Woman using washing-machine on brick floor. Two-pin plug; circuit complete from machine frame to floor.

(b) Using appliances within reach of water-taps or pipes.

Example 1. Woman filling kettle at tap with lead attached. Three-pin plug; earthing lead broken; circuit complete from kettle frame to tap.

Example 2. Man adjusting fire while sitting in bath. Three-pin plug; hand slipped; circuit complete from element of fire to water-pipes through bath.

(c) Using appliances within reach of earthed appliance.

Example 1. Woman fixing iron to point near cooker. Two-pin plug; circuit complete from iron frame to cooker.

Example 2. Child fixing toaster near electric fire. Three-pin plug; circuit complete from element of toaster to frame of fire.

(d) Using appliances with earthed frame.

Example 1. Woman holding kettle connector in one hand prodded connections with skewer held in other; circuit complete from skewer to earthing clip on connector.

Example 2. Child holding frame of fire with one hand prodded elements with knitting needle held in the other; circuit complete from needle to earthed frame of fire.

Analysis of the above eight very general cases shows that: Three would have been prevented by use of three-pin plugs *if in efficient condition*; two resulted from the use of three-pin plugs; two were not prevented by use of three-pin plugs, the failure of the earthing lead in one case left the user in a fool's paradise. A three-pin plug contributed to one other.

There is risk of shock whenever there is possibility of a circuit being completed through one's body. Complete immunity from risk of shock is impossible. However, in an all-electric house the risk is less than that of injury on our roads, of infection in our cinemas, and about equal to that of being trampled to death by wild elephants in St. Paul's Churchyard.

The inferences to be drawn are as follows:—

(a) Portable appliances should be used only where the user cannot, while using the appliance, also touch any earthed conducting medium. They should not be earthed.

(b) Non-portable appliances should be earthed.

(c) All apparatus should be examined annually.

(d) All flexible cables should be regularly inspected and renewed as necessary.

July 9th. B. B.

The Electricity Supply (Meters) Act

With the advent of new legislation compelling all undertakings to have adequate means for testing and calibration of all meters used by them it seems fairly certain that a large sum of money is to be spent by the smaller undertakings in acquiring this equipment.

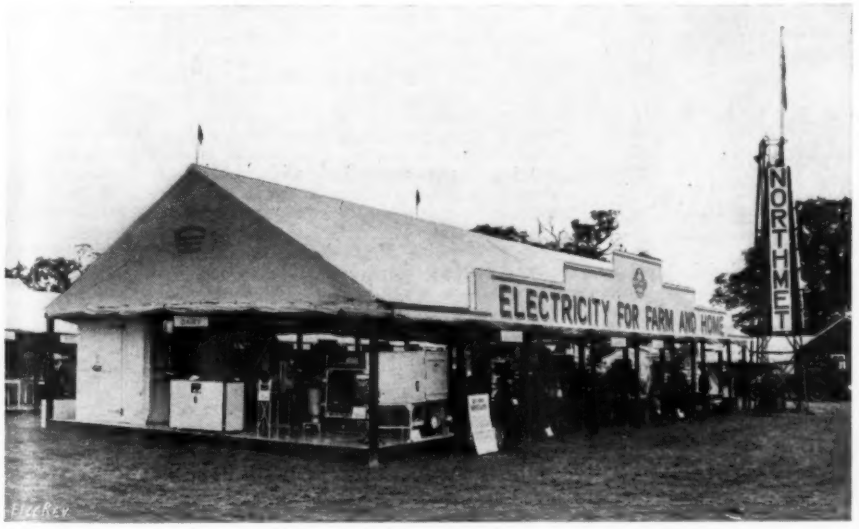
The McGowan Report strongly recommends the elimination of most of these small undertakings, which would result in the centralisation of meter testing in each area. Consequently this extra meter equipment will involve unnecessary expenditure.

The introduction of this Act at the present time appears to have been bad management on the part of the Government when it had a committee sitting to consider distribution and the reorganisation of supply authorities with a view to effecting economies. EAST ANGLIA.

July 8th.

The Great Hertfordshire Show

FOR the tenth successive year the North Metropolitan Electric Power Supply Co. participated in the Great Hertfordshire Show, which was held in Hatfield Park last week (July 9th). This is not only the nearest county show to London, but also the largest one-day show in England. Notwithstanding heavy and continuous rain the Duke of York, who was accompanied by the Duchess, presented prizes in the afternoon.



The Northmet Stand at the Great Hertfordshire Show

The North Met. Co.'s rural activities include the supply of electricity to 219 villages, embracing 25,000 consumers and over 600 farms and horticultural premises. Throughout the area the "all-in" rate is offered, consisting of a fixed annual charge based on the size of the farmhouse and the lighting installation in the farm buildings, with 0.5d. per kWh consumed. Milking machines may be used at this rate without restriction, and also other farm motors and sterilisers not exceeding 10 kW in size, providing they are not employed during the evening peak hours. Hire-purchase terms are available for apparatus and equipment, installations carried out by the company being guaranteed for five years. A special feature this year is the offer of refrigerators at the hire-purchase rate of 2s. 6d. per week, including free installation and maintenance for five years.

The company's show site, 110 ft. by 75 ft., was divided into three, consisting of a covered island stand for agricultural displays, a row of stands for domestic appliances, and a marquee in which local Council officials and farmers were entertained to luncheon and tea. The necessary cables and sub-station, with a 100 kVA transformer, had been specially provided for the show by the company. The principal firms represented in the agricultural section included Kelvinator, Ltd. (milk cooler and cold room, ice cream freezer and refrigerators), R. A. Lister & Co., Ltd. (cream separator), W. J. Woolley & Co., Ltd. (4-kW Clifton sterilising chest), Bastian & Allen, Ltd. (electrode boiler and automatic stoker), Aveling-Barford, Ltd. (bottle washer, milk pump and motor), Vaccar, Ltd. (milking machine), Brook Motors, Ltd. (1 h.p. milking motor and 4 h.p. demonstration motor in cabinet), Martins Cultivator Co., Ltd. (Stamford sterilising chest and churn steaming stool connected to boiler), W. Holland & Co., Ltd. (Adelphi food mixer with motor), Abel & Smith Electric Co. (1 h.p. power box), James Beresford & Son, Ltd. (submersible and other motor driven pumps), F. A. Pullen & Co. (circulator and nursery exhibits, portable spraying plant), Cooper Stewart Engineering Co. (sheep shearers and clippers), Fleet & Co. (greenhouse and frame, fumigator, soil sterilisers), Ransomes, Sims & Jefferies, Ltd. (lawn mower), William Allday & Co., Ltd. (motor-blower forge), Curfew Electric Heaters, Ltd. (incubators, battery brooder, "Pyramid" hover), Geo. H. Elt ("Visi" chick hover), Wiltshire Egg Producers, Ltd. (B. M. & R. egg grading machine), Scientific Poultry Breeders' Association (late hour poultry lighting exhibit), Cope & Cope, Ltd. (egg washing machine), Bingham Appliances, Ltd. (poultry plucking machine), Nelco, Ltd. (egg grader), General Radiological & Surgical Appliance Co., Ltd. (electric pig stunners), Geo. Monro, Ltd. (helix tomato grading machine), Metropolitan-Vickers Electrical Co., Ltd. (5 h.p. portable two-wheel motor driving Bamford cake breaker), General Electric Co., Ltd. (3 h.p. skid motor driving Bamford mill, egg testers, radiant heater for pigs, portable electric drills).

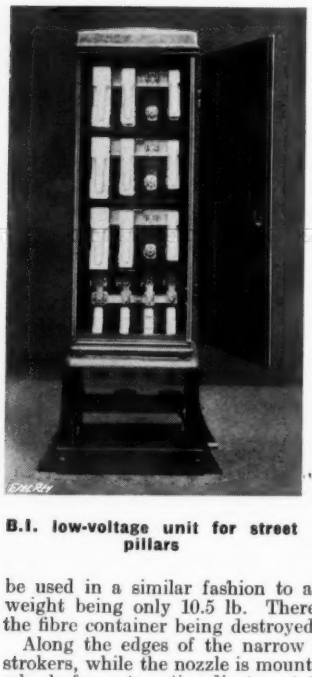
The domestic appliances display included the following: Aidas, Ferranti, Hotpoint, and Benjamin water heaters; Berry's and Eastwoods towel rails; examples of washing machines, Burnley wash-boilers, Thor ironing machine; Kelvinator and Frigidaire refrigerators; Jackson, Hotpoint and G.E.C. cookers; Ferranti and Smith's clocks; G.E.C., Siemens and Windsor "Axia" fans; Benham hot water radiators; Unity convectors and various tubular heaters; Bulpitt plate warmer, kettles, saucepans, coffee percolators, immersion heaters, and car heater; Henley's waffle and soldering irons; Belling, Berry, Ediswan, Ferranti and G.E.C. fires; Revo, G.E.C., Siemens, Henley and "Epic" clothes irons; Hoover, Hotpoint and G.E.C. vacuum cleaners and floor polishers; G.E.C. shaving mug; "Epic" and G.E.C. toasters; Hawkins and G.E.C. hair dryers; British Central Electric Co.'s "Gripper" hand lamp; and a selection of table and floor lamp standards, &c.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

An Improved Street Pillar Unit

A low-voltage unit (No. 36) for use in their street pillars recently designed by BRITISH INSULATED CABLES, LTD., Prescot, Lancs, differs from the No. 32 model in that the fuse contacts are screwed directly to the bus-bars instead of being riveted to angle-pieces bolted to the bars.



B.I. low-voltage unit for street pillars

This construction eliminates one contact surface between each cable conductor and the bus-bars and, at the same time, permits of the fuses on each phase being mounted closer together. The economy of space allows room for mounting fifth-core fuses on the units instead of on brackets fixed to the pillar sides, eliminating the wiring to these fuses and reducing the overall width of the pillar.

Lightweight Electric Cleaners

The latest type of household suction cleaner offered by M. C. DIZER, LTD., Africa House, Kingsway, London, W.C.2, is obtainable in four colours. The whole outfit is made in England, and it is driven by a B.T.H. motor. This cleaner is intended to be used in a similar fashion to an ordinary broom, its total weight being only 10.5 lb. There is no dust bag to empty, the fibre container being destroyed when full.

Along the edges of the narrow nozzle are two fibre carpet strokers, while the nozzle is mounted on two separately sprung wheels for automatic adjustment to varying carpet thickness; these wheels are easily detachable when cleaning stairs and awkward corners, and the swivel joint allows the nozzle to go under low furniture.

A window permits the quantity of dust being removed to be seen. By turning an arrow on the window the suction is reversed from the nozzle through the handle, which is hollow and can thus be used with or without a flexible hose and dusting tools. The latter include a floor polisher. The machine can also be used as a blower with a spraying attachment.

Power Fuse-boxes

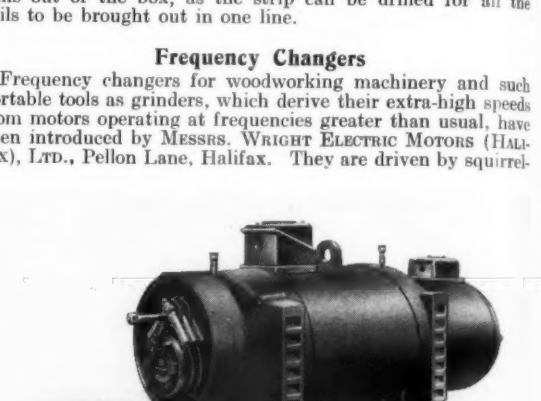
MESSRS. SIEMENS BROTHERS & CO., LTD., Woolwich, London, S.E.18, have recently introduced a range of power fuse-boxes for three- and single-phase circuits up to 400 A. They provide protection at the termination of service cables to large buildings in place of dividing boxes coupled by means of rubber-insulated cables to single-pole fuses, or, alternatively, circuit-breakers. English Electric "J.P." cartridge-fuses with wedge contacts are supplied as standard, although in the size rated for cables up to 0.25 in. the Siemens porcelain handle with wire fuse for up to 300 A can be fitted.

Siemens three-phase, four-way power fuse-box

All boxes are suitable for looping the supply cable in and out. A cable entry is provided at each side, and the larger sizes have two entries at the bottom. Across the top is an insulated strip in place of the usual single-entry bushes. When each fuse controls more than one circuit there is no difficulty in bringing the rubber tails out of the box, as the strip can be drilled for all the tails to be brought out in one line.

Frequency Changers

Frequency changers for woodworking machinery and such portable tools as grinders, which derive their extra-high speeds from motors operating at frequencies greater than usual, have been introduced by MESSRS. WRIGHT ELECTRIC MOTORS (HALIFAX), LTD., Pellon Lane, Halifax. They are driven by squirrel-cage motors (obtainable for two- or three-phase, 50-cycle inputs) which are flange mounted to the changer.



The Wright frequency changer

The high-frequency output is taken from the rotor slip-rings of the changer. Output frequencies of from 163 to 350 cycles at spindle speeds up to 21,000 r.p.m. are obtainable, the changer being made with from two to twelve poles. For each model there are two spindle speeds. The difference is constant and is obtained by reversing one of the phases of the changer stator, which is excited from a 50-cycle external source.

Full-wave Valve Rectification

A new full-wave valve rectifier has been released by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. This type (V18) has a directly heated filament with a rating of 3.75 A at 4 V. The maximum rectified current output is 250 mA (smoothed with a 4 μF condenser) and the maximum anode voltage rating is 500+500. Its particular application is to the larger radio receivers or power amplifiers.

A Household Floor Polisher

For domestic purposes C.C.A. (VACUUM CLEANERS), LTD., 138, Lever Street, London, E.C.1, have introduced a household type "Poliflor" floor-polisher. It comprises a single circular brush, revolving in a horizontal plane, driven by a 250-W universal motor housed above it. The weight of the machine is 14½ lb., and 20 ft. of flexible is supplied to enable it to be moved to any part of the room. To obtain a highly polished surface it is advisable to use the washable cloth supplied with the machine. The cloth is laid on the floor and the polisher placed in the centre.

The "Junior Poliflor"

Testing Battery Cells

The latest "Hoyt" meter supplied by GORDON EQUIPMENTS, LTD., 25, Milton Street, London, E.C.2, is the "Dial-lite Junior" cell tester. It has similar features to the "Dial-lite Senior," but is lower in price. The 2½ in. dial gives clear voltage readings between 2½-0-2½ V, and is illuminated automatically so that the instrument can be used in dark places. The load current is approximately 200 A, but a stop charge device enables readings to be taken on both open and closed circuits.

A Mains Test Meter

A high grade universal test meter for 0-500 V a.c. or d.c. is obtainable from ELECTRICAL & AUTO PRODUCTS (1931), LTD., 280, Deansgate, Manchester 3. It is fitted with a clear scale and a dead-beat air damped movement; no metal is exposed and the meter proper is mounted in a square moulded bakelite case. The leads are reinforced and fitted with insulated test prongs.

Parliamentary News (BY OUR SPECIAL REPORTER)

FURTHER evidence was given on July 8th before Lord Milne's Committee of the House of Lords in support of the Bill promoted by the Gas Light and Coke Co. to impose on local authorities owning electricity undertakings the obligation to afford the company facilities to put gas pipes into their houses during construction.

Mr. R. W. Foot, general manager of the company, said that the Bill would not give them the right to install apparatus but only to put gas pipes, joints and connections into the houses. Apparatus would only be installed afterwards at the express wish of the tenant. Cross-examined by Mr. Craig Henderson, K.C., for the West Ham Corporation, Mr. Foot said it was true that the gas company used electricity to light its showroom windows because if it used gas it would develop too much heat and probably crack the glass.

Mr. Craig Henderson asked whether in the case of a tenant who wished to change from gas to electricity the gas company held the tenant to payment of two years' rent for a gas cooker. Mr. Foot replied that a tenant got ordinary apparatus without any agreement, but in the case of special cookers highly enamelled and thermostically controlled it had been found necessary to draw up a two years' agreement.

Cross-examined by Mr. J. H. Thorpe, K.C., appearing for over twenty local authorities, Mr. Foot agreed that there had been no complete denial of facilities to his company on the part of any local authority except West Ham and, for a short period, Willesden.

On July 9th Mr. Craig Henderson addressed the Committee on behalf of West Ham. He said the argument had been put forward that it was cheaper to put in gas pipes while houses were being built. That was not a good ground for legislation. Parliament did not exist to save gas companies money. The company already had the right to take gas into any house when the occupier demanded a supply. It now asked for a new commercial advantage without any corresponding obligation. It asked to have the right to install pipes without charge, but if the Corporation asked it to do it it could refuse. Even if that obligation were put upon the company it would not remove the Corporation's objections.

On July 10th Mr. C. L. Fulcher, borough engineer, of Shoreditch, said that although the gas company was given full facilities to put in gas pipes in Council flats it only did so for heating purposes.

Mr. J. H. Thorpe, K.C., addressing the Committee on behalf of fourteen Metropolitan boroughs and twelve corporations outside the Metropolitan Area, stated that Parliament said in 1934 that tenants must have freedom of choice as between gas and electricity. His clients appreciated the position and had not broken the law. In law a gas company had no more right to enter a Council housing estate than to go into the library of a member of the Committee, but, in fact, his clients had allowed the gas company to put pipes into their houses when they were being erected.

Mr. Tyldesley Jones, K.C., in his concluding speech for the promoters on July 13th, said that if the local authorities were not required to give the gas company facilities when houses were being erected and the gas company was forced to do the work after the houses were occupied it could only result in inconvenience to tenants and extra cost to the company. There could be no real ground of opposition when three of the witnesses for the local authorities said that in their boroughs facilities were already given and one borough surveyor at any rate said he welcomed the gas company.

The Committee, after a short deliberation in private, decided to allow the Bill to proceed.

Bills Advanced

In the House of Lords on July 7th the Stalybridge, Hyde, Mossley and Dukinfield Joint Transport and Electricity Board Bill was read a third time and passed. In the House of Commons last week the North Metropolitan Electric Power Supply Bill received its third reading, and the Lords' amendments to the Colne Valley and Northwood Electricity Bill were agreed to.

Telephone Concessions

On July 13th Sir R. Young asked the Postmaster-General whether he proposed to make any further concessions to users of the telephone service

Major Tryon said that since October, 1934, when a series of reductions in telephone charges was inaugurated, the growth of the system had been remarkable and the annual increase in telephones was now about double that of the years preceding the reduction of rates. That growth had been accompanied by very satisfactory increases in revenue and, with a view to bringing telephone service within the reach of a still wider circle and of increasing its usefulness and cheapness to those who already had it, he proposed, with the concurrence of the Chancellor of the Exchequer, to introduce further concessions.

From October 1st next every subscriber on a quarterly basis under the ordinary residential rates for exclusive lines would be able to make 50 penny local calls a quarter free of charge. Similarly, the first 16 local call units in each month would be given free to ordinary monthly residential subscribers.

It was with the small user that the chief potentialities of development lay, as they had found from the success of the business small user tariff amongst small shop-keepers and one-man businesses. The concession of free calls was not so suitable to this service which was largely used for incoming calls. He proposed, therefore, to make a flat reduction in the business small user tariff of 10s. a year and a similar reduction would be applicable to all ordinary business lines. In the case of those businesses which rented additional lines to the same premises, the rental for each of these auxiliary lines would also be reduced by a further 10s. a year, and there would be consequential reductions in associated services. In January next he also proposed to make certain reductions in the charges for private lines up to 24 miles, with corresponding reductions in respect of the first 24 miles of longer circuits.

These concessions, taken in conjunction with the reduced charges for extension telephones introduced last January and the further reductions in trunk charges which came into force in May, represented a very considerable all-round cheapening of telephone services, affecting all classes of users. In fact, the reductions made during the present year were estimated to involve the sacrifice of revenue, after allowing for additional business induced by the lower tariffs, to a total amount of one and a half million pounds in the first full year, but he felt confident that this sacrifice would be amply repaid by the further assistance it would afford to trade and in facilitating business and social communications throughout the country.

The Cost of Standardisation

On July 13th Mr. Parker asked the Minister of Transport whether the Electricity Commissioners had the necessary data from which to make reliable estimates of the cost of standardisation, in view of the importance of achieving standardisation of domestic consumers' voltage and system of supply, and the present inconvenience to the public due to the numerous voltages of both a.c. and d.c.; and, if not, would he request the Electricity Commissioners to acquire this data.

Captain Hudson said that this question was considered by the recent Committee on Electricity Distribution, and pending the decision of the Government on the Report of that Committee, the Minister did not feel justified in calling upon the Electricity Commissioners to incur the heavy expense of compiling further data.

Electrical Power from Water

On July 14th Captain Ramsay asked the Secretary for Mines whether he was aware that many foreign countries, with ample supplies of water power, were now finding it more economical to generate electrical power from coal imported from this country; and what steps he was taking to press the interests of British coalfields with regard to production of electrical power in this country.

Captain Crookshank said that his Department had not the necessary information to enable him to deal with the first part of the question. As regarded the second part, it could safely be left to the coal industry to see that the interests of that industry were properly considered when promoters of new schemes sought, as he was advised they must do, Parliamentary authority for such schemes. If he was approached by the industry, he was, of course, prepared to consider whether there was any action that he could take.

Cambridgeshire Charges

On July 14th, Captain Briscoe asked the Minister of Transport if there had been any recent alteration in the charges for electricity at Foxton and Sawston, Cambridgeshire; and, if so, to what extent and for what reason had they been increased or decreased.

Captain A. Hudson said that the Bedfordshire, Cambridgeshire and Huntingdonshire Electricity Co. had recently introduced a new schedule of tariffs. Representations had been made that the new two-part domestic tariffs resulted in some cases in a higher average charge per kWh to consumers than the previous domestic tariff, and the Electricity Commissioners were in correspondence with the company on the point.

Trolley Buses in Manchester

The Manchester Corporation Bill was considered on July 14th by the Select Committee of the House of Commons on Unopposed Bills. Capt. R. C. Bourne (Oxford, U.) presided. Sir Harry Pritchard, who presented the Bill, said it would give the Corporation additional powers with regard to trolley vehicles both on new routes and in substitution for tramways. The Corporation sought authority to run trolley vehicles on any tramway route in the city whether the trams were abandoned or not, but the Minister of Transport would be able to require the abandonment of tramways on trolley vehicles being substituted. Outside the city there would be similar powers subject to the consent of the local authority with a right of appeal to the Minister if consent was unreasonably withheld.

The Chairman asked whether in time the Corporation would scrap all the trams. Sir H. Pritchard said that that could be done under this Bill, but the Corporation had not come to any definite conclusion.

The Bill was ordered to be reported for third reading.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

The Empire Exhibition, Johannesburg

The Lord Mayor of Liverpool, Mr. P. J. Robinson (city electrical engineer), and Mr. T. E. Lescher (chairman of the Liverpool Chamber of Commerce) visited the Strowger works of the Automatic Electric Co., Liverpool, on July 9th to inspect the stand and exhibits of the company which are to be

Mr. T. E. Lescher, the Lord Mayor, and Mr. P. J. Robinson at the Strowger Works of the Automatic Electric Co.

shipped to South Africa. The company is exhibiting in the Empire Exhibition at Johannesburg. In the accompanying picture the visitors are seen viewing a demonstration of A.T.M. mine signalling apparatus.

The General Electric Co., Ltd., will be among the British manufacturers who have arranged to make a display of their products at the Empire Exhibition to be held in Johannesburg from September 15th next till January 15th, 1937. The stand which the company proposes to have in the special Electrical Pavilion has been designed and built in London, and is being shipped in sections to South Africa, while two of the company's head office staff, Mr. A. Clarkson, manager of the Exhibition Department, and Mr. A. G. B. Colyer, of the Export Department, are to go to Johannesburg to supervise its erection and arrange its contingent display. The exhibits will be of a comprehensive and representative character, and will be supplemented by various models and by pictures.

One of the principal exhibits of Messrs. A. Reyrolle & Co., Ltd., will be an 800-A, 33,000-V, 750,000-kVA electrically operated duplicate bus-bar metal-clad circuit-breaker panel fitted with turbulator contacts. A special model will be on view to demonstrate the operation of turbulator contacts, specially arranged neon lighting adding realism to the effect. Another model will give an impression, aided by neon lighting effects, of a short-circuit testing station surrounding a screen on to which will be projected film records of actual short-circuit tests on switchgear. Several exhibits typical of Reyrolle accessory equipment will also be on view. These will include 5- and 15-A "Easigo" outlet and inlet plugs and sockets, both dust-proof and weatherproof types; 5-A fused plugs; a range of heavy-duty cartridge fuses; "Reyvaux" off-peak load-control unit; 15-A triple-pole metal-clad contactor; "Reylovolt" low-voltage transformer; earth-leakage trip switch; all-insulated house-service switch and fuse box; 5-A interlocked switch and plug; three-pole metal-clad weatherproof air-break switch-and-fuse box fitted with plug and socket; and double-pole metal-clad weatherproof air-break switch-and-fuse box.

The New Barkingside Showroom

New showrooms for the Ilford Corporation Electricity Department were formally inaugurated on July 3rd at High Street, Barkingside. This is the third showroom opened by the Corporation, and it is designed to afford facilities to the residents of North Ilford. As the illustrations below show, there are two display windows with an entrance in the centre, the front of the premises being used as a general showroom for electrical appliances and the rear as a demonstration electric kitchen. The floor above has been constructed as an all-electric flat. In connection with the opening two entertainments and demonstrations are being given daily during the current week in two large marquees which have been erected on land adjoining the showroom. Some idea of the rapid progress of the undertaking can be gathered from the fact that during the past four years the number of consumers has increased from 26,800 to 40,400 and the sales of electricity from 26,708,000 kWh to 49,063,000 kWh. The demand for domestic supply consequent on the increasing popularity of domestic electrical apparatus has been responsible for this large increase. There are two assisted wiring schemes in operation and over 7,000 ratepayers have taken advantage of these schemes, and the domestic appliances connected at the end of last year aggregated 63,557, representing a domestic apparatus load of 93,126 kW. The Council has extremely low domestic contract and all-in rates, and has recently introduced a new two-part tariff for business premises consisting of a primary annual charge of £10 per kW, plus a secondary charge of ½d. per kWh for all electricity used for lighting, heating and cooking purposes. The borough electrical engineer and manager is Mr. G. F. Gregory.

Registered Electrical Contractors

At the last meeting of the Executive Committee of the National Register of Electrical Installation Contractors the following applications for registration were accepted:—

North Cheshire Electric Co., Ltd., Cheadle Hulme, Ches.
Fillingham & Thompson, Urmston.
Ellison, G. S., West Didsbury, Manchester.
Clegg, G. A., Manchester, 4.
Ellwood, A., Wigton.
Wainwright, S. B., & Co., Ltd., Manchester.
McKeand & Foulger, Blackburn.
Bundle, E. A., London, N.1.
Haigh, F., Bradford.
Fryer, A. E., & Co., Moss Side, Manchester.
Simpsons, Lancaster.
Westlake, C. H., Plymouth.
Cockram, J. W. (trading as Electrical Efficiency Service), Luton.
Morris, W. B. W., Croston, nr. Preston.

At the same meeting nine applications were declined.

Marconi-Ekco Instruments, Ltd.

Marconi's Wireless Telegraph Co., Ltd., and E. K. Cole, Ltd., have decided to form a jointly owned company to be

An exterior view of the new Barkingside showrooms of the Ilford Electricity Department and the demonstration electric kitchen

called Marconi-Ekco Instruments, Ltd., with a nominal capital of £5,000. The chairman will be Lord Inverforth. The main object of the new company will be to combine the activities of both concerns in the fields of measuring instruments, diathermy and electro-medical apparatus. The range will embrace not only highly specialised precision apparatus for radio and other purposes, but also the more popular general requirements. It is intended to co-ordinate and intensify research in connection with the above-mentioned fields, and considerable progressive developments may be anticipated. The address of Marconi-Ekco Instruments, Ltd., will be Marconi Offices, Electra House, Victoria Embankment, London, W.C.2.

Radio Valve Price Reduction

The British Radio Valve Manufacturers' Association has issued an announcement to all retailers who held agreements with the Association at June 30th. This is to the effect that from July 14th, the retailers' discount on B.V.A. valves has been increased and the list prices of certain valves made by the members have been substantially reduced from the same date. The new prices apply to valves sold under the names of Cossor, Mazda, Marconi, Mullard, Osram, Philips, Ferranti, Ever-Ready, and Brimar.

Electrical Sports Meetings

The J. & P. Sports Club (Johnson & Phillips, Ltd.) held its eighth annual sports and gala on the company's sports ground at Kidbrooke on July 4th. Although the weather was below the usual standard for J. & P. sports days, it was kind enough to allow the big entry of competitors and their friends to enjoy a long and varied programme. Mr. G. L. Wates (chairman of the company), Sir Philip Dawson, M.P., and Messrs. H. J. Sheppard and C. Stewart (directors) were present, and Sir Philip Dawson presented the prizes at the close of the meeting.

The second annual sports in connection with the South Somerset and District Electricity Co.'s Social and Sports Club, which took place on the sports field at Roundham on July 11th, provided an enjoyable afternoon for the employés and for their children, the company numbering over 200. Excellent arrangements had been made by the committee responsible for the running of the club, of which Mr. H. S. Prowse (the manager) is chairman and Miss Bishop hon. secretary. Besides sports, there was a skittles competition, won by Mr. Satterley. In the sports programme there were several interesting events and close finishes. At the close the prizes were presented by Mrs. Prowse.

The English Electric Co., Ltd., held its fifth annual interworks social and athletic meeting at Bradford on July 4th. Nearly 1,000 employés from Stafford, Rugby and Preston made the journey to Bradford by rail and road and about 4,000 people assembled on the sports field. On arrival at Bradford the visitors were given light refreshments and then conducted through the works, later taking luncheon in the works' canteen, during which the English Electric Orchestra played a programme of light music. Afterwards the employés and friends went to Phœnix Park, the headquarters of the company's Bradford Sports Association, where they were addressed by Mr. L. J. Sarjeant, manager of the Bradford works, who took the chair in the unavoidable absence of Mr. G. H. Nelson, chairman and managing director of the company. Last year

Henley's Horticultural Show

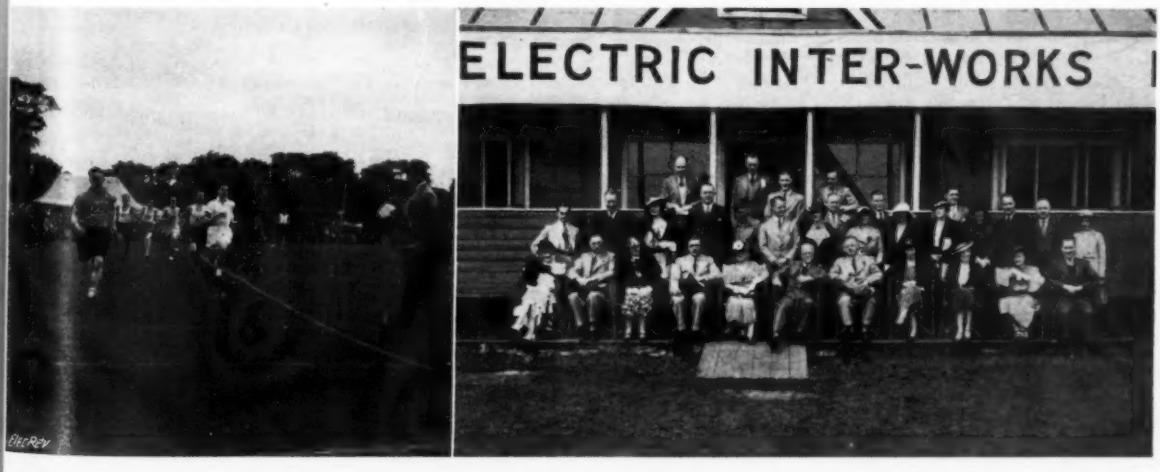
On July 9th the social club room at Henley's head offices was the setting for the first annual horticultural exhibition of the Henletel Social and Athletic Club. Mr. W. F. Bishop, director and general manager of the company, himself a keen horticulturalist, took a special interest in the venture from its inception. His own head gardener from "Ashridge," Enfield, Mr. J. Soar, partnered Mr. F. Ford, head gardener to Mr. Vieusseux, of "Woodbury," Enfield, in judging the exhibits. Messrs. C. Cocks and S. Norris were the most successful competitors, carrying off a number of prizes. An outstanding item in the ladies' classes was the first-prize entry of mixed flowers, arranged for effect, exhibited by Miss Bishop,

Judging the exhibits at the horticultural exhibition of the Henletel Social and Athletic Club

of the Order Department. Miss Langdon, of the same department, took first prize for sultana cake, the second prize being secured by Miss Edwards (Accounts Department). In the needlework class Miss Upfold (Buying Department) carried off first prize for an afternoon frock, Miss Bishop (Order Department) first for underwear, while Miss W. Grubb and Mrs. Hathaway (both Sales Department) tied in the knitted jumper class. Presiding at the prize distribution, Mr. F. J. Bettley, Social Club chairman, said the spade work which had been put in to make the show successful had been well worth while. Mr. W. F. Bishop distributed the prizes.

British Overseas Electrical Trade

Our electrical trade showed a satisfactory expansion during the half-year to the end of June, exports rising by 10 per cent. and imports by 23 per cent. The Board of Trade returns for last month give the total value of equipment shipped overseas during the half-year as £6,989,435, against £6,344,805 in the corresponding period of last year, representing an increase



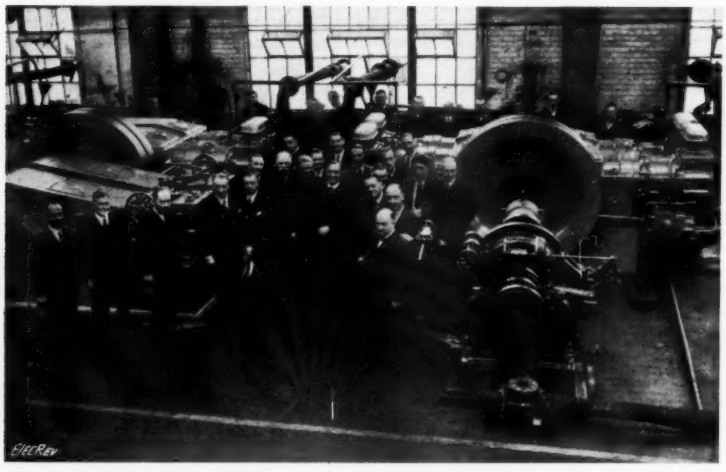
Left: One of the events at the J. & P. sports. Right: A group at the sports of the English Electric Co., Ltd., including Sir Holberry and Lady Mensforth

Stafford were successful in winning the aggregate cup from Rugby, and this year Bradford were the first winners of the Mensforth shield for athletics presented by Sir Holberry Mensforth, a director. There was a full day's sport, and in the evening the Mensforth shield, cups and prizes were presented by Mrs. Sarjeant, supported by Mr. Sarjeant. Among those present were Sir Holberry and Lady Mensforth, Messrs. H. L. Firth (chief steward), Graham and Sabin (Stafford), Wooton (manager of Preston works), and Smith (Rugby).

of £644,630. The most marked expansion was in respect of machinery such as transformers, control gear for motors, switchgear, &c., which rose from £1,083,439 to £1,399,390 (29 per cent. increase). Imports amounted to £1,962,359 against £1,591,078; the increase of £371,281 is spread over most of the items set out in the returns. In June itself, the value of exports was £1,058,430, which was £52,603 (5 per cent.) more than in June, 1935, while imports at £329,218 were up £84,340 (34 per cent.).

Australian Electrical Imports

The nine months, July-March, of Australia's last trading year witnessed a substantial increase in imports of electrical material compared with the corresponding period of 1934-35. The total value, at £2,524,000, was £763,000 above the level of the previous twelve months. The group which contributed most to this advance was cable and covered wire, with a total for 1935-36 of £712,000 as against £493,000 for the corresponding nine months of 1934-35. Telegraph and telephone material accounted for £210,000 of the increase, with a total of £370,000 for the nine months of 1935-36. Imports of lamps, at £166,000, were about the same as a year before, as also were those of batteries and accumulators, at the low figure of £15,100. The total of unspecified electrical machinery and appliances was large, viz., £896,000, as compared with £730,000 during the nine months July-March, 1935.



Members of the Diesel Engine Users' Association at the works of the Brush Electrical Engineering Co., Ltd.

A Travelling Show Van

The Rawlplug Co., Ltd., has recently put into service seven new travelling show vans for touring the British Isles and Europe. These have two large side display windows and a rear display window, each well illuminated, and a counter fitted to the offside and the rear of the body.

Trade Announcements

The British Mannesmann Tube Co., Ltd., has changed its name to the Newport and South Wales Tube Co., Ltd. The company is now entirely under British control, and there will be no alteration in the range of products hitherto manufactured at Newport and Swansea.

Messrs. Heyes & Co., Ltd., of Water-Heyes Electrical Works, Wigan, have opened a London office at Bank Buildings, 20, Kingsway, W.C.2 (telephone: Holborn 6219), and Mr. S. J. Roseblade has been appointed manager in charge.

The *Irish Electrician* has suspended publication.

Flinders (Wholesale), Ltd., 14-20, St. Peter's Street, Ipswich, has been appointed agent for the Silvertown Co. for the territories covered by its five branches at Ipswich, Colchester, Norwich, Cambridge and Lincoln, which will hold stocks.

Annual Holidays

Asea Electric, Ltd., announces that its offices will be working with a depleted staff from July 18th to August 4th, and its works will be closed from July 25th to August 4th. A nucleus staff only will be in attendance during the latter period to deal with urgent matters.

The works of Messrs. Thomas Broadbent and Sons, Ltd., Huddersfield, will be closed from July 17th until July 27th.

Messrs. E. R. & F. Turner, Ltd., and Bull Motors, Ipswich, are closing their works during the whole of Bank Holiday week. The offices will be open and correspondence dealt with as usual.

The Brush Electrical Engineering Co., Ltd., is closing its works from August 1st to 8th inclusive. A skeleton staff will be in attendance to deal with urgent matters.

A New Furnace Company

Metalectric Furnaces, Ltd., whose registration is noted in the "New Companies" section of this issue, has acquired world-wide rights and licences for the manufacture and sale of an important series of basic furnace patents and processes. Its Smethwick works incorporate iron and steel foundries, machine, erecting, steel-work, welding and sheet-metal shops and physical and chemical research laboratories. The furnaces produced will cover a complete range for the ferrous and non-ferrous industries, from small portable units and low temperature re-circulating systems, to the largest mechanised full automatic continuous units with auxiliary equipment for bright annealing, atmosphere control and similar processes. The manufactures will include "Zontrol" heat-treatment furnaces, industrial pyrometers, controllers, etc.

Works Visit

The summer meeting of the Diesel Engine Users' Association was held on July 8th at Loughborough. The party was divided into two groups, one visiting the Loughborough College and the other the works of the Brush Electrical Engineering Co., Ltd. The visitors were welcomed at the works by Mr. H. E. Midgley, deputy chairman of the company, and divided into small parties were conducted round the works, inspecting Brush Diesel engines and two 30,000-kW Brush-Ljungstrom turbo-alternators in course of construction, including various detailed equipment, such as the manufacture of blading used in the turbine portion, the rotors and stators.

The visitors were also conducted through the electrical shops, transformer department, and the passenger vehicle body-building shops. After the visit they proceeded to Loughborough College where they took tea at the invitation of the principal, Dr. Schofield, and where the general meeting was held and the presidential address was given. The accompanying illustration shows some of the visitors inspecting two of the 300 b.h.p. Brush horizontal opposed Diesel engines for the Blue Star Line, part of an order for sixteen. The motor transport in Loughborough was arranged by the Brush Company, the parties being conveyed both to the College and to the Falcon Works in oil engine vehicles built by the company, the engines being of A.E.C. manufacture.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price. July 15th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£36	—
a Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£15 10s.	—
a Potash, Chlorate ... ... per lb.	3½d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 18s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/3 to 2/9	—
p Babbitts Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£176	£10 inc.
Grade II... ... ... ,,	£122	£6 inc.
Grade III ... ... ,,	£66	£2 inc.
c Brass (rolled metal 2" to 12" basis) per lb.	7¾d.	—
c ,, Tubes (solid drawn) ... ... ,,	9¾d. to 10d.	—
c ,, Wire, basis ... ... ,,	7¾d.	—
c Copper Tubes (solid-drawn) .. ... ,,	10¼d.	—
g ,, Bars (best selected)... ... per ton	£68	—
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£41 7s. 6d.	7s. 6d. inc.
d ,, ,, Wire Rods ... ,,	£46 17s. 6d.	7s. 6d. inc.
d ,, ,, H.C. Wire ... per lb.	7¾d.	—
f Ebonite Rod ... ... ,,	1/6 to 2/– plus	—
f ,, Sheet ... ... ,,	1/3 to 1/6 10%	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	9¾d.	¼d. inc.
i Iron, Pig (Cleveland, No. 3) ... per ton	67/6	—
i ,, Wire galv. No. 1, P.O. Qual.... ,,	£20	—
g Lead, English Pig ... ... ,,	£17 10s.	10s. inc.
g Mercury ... ... per bot.	£11/12/6 to £12/2/6	5s. dec.
e Mica (in original cases) small ... per lb.	9d. to 1/6	—
e ,, ,, ,, medium ... ,,	5/– to 10/–	—
e ,, ,, ,, large ... ,,	10/6 to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11¾d.	—
p ,, ,, rolled strip & sheet ,,	11¾d.	—
p ,, ,, wire ... ... ,,	1/0¼d.	—
o Platinum ... ... per oz.	£8	10s. inc.
d Silicium Bronze Wire ... ... per lb.	8 1/16d.	1/16d. inc.
g Spelter... ... ... per ton	£13 7s. 6d.	6s. 3d. dec.
r Steel, Magnet, in bars ... ... per lb.	7¼d.	—
g Tin, Block (English) ... ... per ton	£192 10s.	£11 10s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

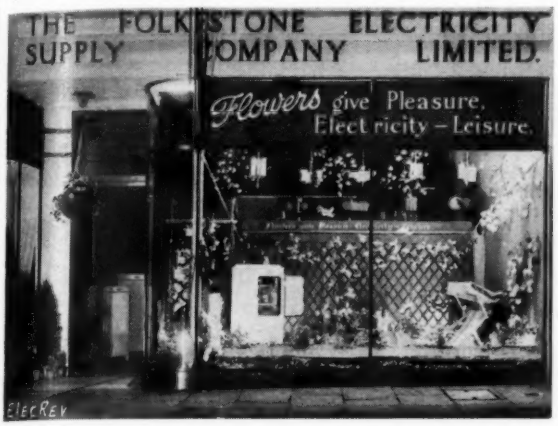
Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

Folkestone Floral Week

In connection with the Folkestone Floral Week, which coincided with the E.C.A. Conference, the Folkestone Electricity Supply Co., Ltd., arranged a special display in its showroom window, and was successful in winning a medal for this. As



A floral window display by the Folkestone Electricity Supply Co., Ltd.

our picture shows, the floral setting proved an attractive means of drawing attention to the benefits of electricity.

British Foundry School

The first annual general meeting of the British Foundry School will take place at 3 p.m. on July 21st at the Education Offices, Margaret Street, Birmingham.

Works Extension

The Midland Electric Manufacturing Co., Ltd., of Barford Street, Birmingham, has acquired a fourteen-acre site at Tyseley on which to erect a new factory which will occupy 250,000 sq. ft. It will be devoted to the production of switchgear, motor control gear and other apparatus primarily intended for industrial use. The new factory will not be in full production for twelve months. It will include a foundry and a pottery; in the latter porcelain insulators will be made.

New Catalogues and Lists

Ferranti, Ltd., Moston, Manchester, 10.—Catalogue R113 giving comprehensive details of the whole range of Ferranti all-wave receivers, radiograms and extension speakers, with notes on how to log distant stations, and the Ferranti "Magnascopic" dial.

British Insulated Cables, Ltd., Prescot.—A leaflet dealing with B.I. flexibles with acid-resisting finishes.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.—Illustrated leaflets relating to three new radio receivers which the company is introducing.

Nevelin Electric Co., Ltd.—A brochure dealing with mercury arc rectifiers for supplying cinema projector arcs and for battery charging.

Austin Walters & Son, Ltd., Little Peter Street, Manchester.—An illustrated booklet of neon sign installations made and supplied by the company.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Pamphlet No. 991 describing automatic synchronising equipment.

Asbestos Manufacturers Co., Ltd., 47, Victoria Street, Westminster, S.W.1.—A well-produced catalogue containing illustrations and particulars of the company's specialities in asbestos packings, jointing and beltings. Reference to the various sections is facilitated by a thumb index.

Cuthbert Andrews, 47, Red Lion Street, High Holborn, W.C.1.—A brochure describing the "Rapidex" totally immersed X-ray unit.

R. & A. G. Crossland, Price Street, Birmingham.—A broadsheet illustrating various types of "Croslac" industrial lighting equipment.

Westinghouse Brake & Signal Co., Ltd., 82, York Road, King's Cross, London, N.1.—A booklet giving particulars of metal rectifiers for projector arcs.

Foster Engineering Co., Ltd., Apex Works, South Wimbledon, London, S.W.19.—The 12th edition of the "Apex" switchgear catalogue. Many of the types have in the last year been redesigned and a number of new switches have been added in consequence of the requirements of the new Wiring Rules.

Knightshades, Ltd., Derby Road Works, Montague Road, Edmonton, N.18.—The new season's list of lamp shades, with numerous coloured illustrations.

Laurence, Scott & Electromotors, Ltd., Norwich.—An illustrated brochure giving details of flame- and explosion-proof motors for mines.

Brook Motors, Ltd., Empress Works, Huddersfield.—An illustrated and priced list descriptive of a 30 A contactor starter for three-phase across-the-line motors.

Dowsing Co. (Elecl. Manufacturers), Ltd., Kangley Bridge Road, Lower Sydenham, S.E.26.—List No. 207 giving priced particulars of industrial electric irons.

The Westminster Tool & Electric Co., Ltd., Westool Works, Putney Bridge Road, S.W.15.—"Impregnating," part 4 of a series on coils.

Higgs Motors, Ltd., Witton, Birmingham.—A leaflet illustrating some of the company's motor units.

Seal Electric, Ltd., 7, Edward Street, Westminster, London, S.W.1.—An illustrated and priced leaflet describing a new surface extension conduit box.

Aidas Electric, Ltd., Sadia Works, Park Avenue, North Circular Road, N.W.10.—A pamphlet describing electric water-heaters with indirect heating.

Bankruptcy Proceedings

H. Carnell, 94, East Hill, St. Austell, Cornwall, radio engineer.—The public examination was held on July 6th at Truro, when it was stated that there was a deficiency of £325. The debtor commenced business on his own account in 1933 with a small capital, and he attributed his failure to insufficient profit on sales of wireless sets and the turnover being too small to yield sufficient profit to enable him to meet his liabilities. The debtor's drawings had been £4 a week.

T. S. Cocks, 219, Milton Road, Portsmouth, wireless dealer.—The public examination herein was held on July 6th at the Court House, St. Thomas's Street, Portsmouth, when it was stated that there were liabilities of £177 against assets of £415, or a surplus of £238. The debtor stated that in October, 1934, he purchased a wireless dealer's business at the above address for £200 as a going concern. He attributed his position to lack of capital and failure to realise certain freehold property. The examination was adjourned.

A. H. Lipman (H. Lipman & Co.), electrical and general factor, 49, Jubilee Street, E.—Receiving order made July 8th on a creditor's petition. First meeting July 21st and public examination October 16th, both at Bankruptcy Buildings, Carey Street, W.C.

R. A. Robinson (Highbury Engineering Works), radio and electrical engineer, 287, Upper Street, Islington, N.—Discharge suspended for six months until December 16th, 1936.

A. M. Gibson and **W. R. F. Gibson** (Gibsons Wireless), 94, Tavistock Road, Plymouth, 15, Exeter Road, Exmouth, and 15, Bank Street, Teignmouth.—The discharge of A. M. Gibson is suspended for six months until December 10th, 1936, and the discharge of W. R. F. Gibson is adjourned for six months.

L. S. Walter, electrical engineer, 48, Broad Street, Banbury.—Last day for receiving proofs for dividend July 24th. Trustee, Mr. J. B. Simmons, 8, Forbury, Reading, Official Receiver.

W. H. Colman (Colman & Co.), electrical and radio engineer, c/o 37, Rowlands Road, South Yardley, Birmingham, lately carrying on business at 110, Dale End, Birmingham.—First and final dividend of 7d. in the £, payable July 15th at 159, Great Charles Street, Birmingham.

H. Cooke (Western Wireless), wireless and electrical engineer, 33, Fisherton Street, Salisbury.—Receiving order made July 3rd on debtor's own petition. First meeting July 17th at 12, Rolleston Street, Salisbury. Public examination September 10th at the Guildhall, Salisbury.

P. & L. Radio, 11, Manor Green Road, Epsom.—Public examination August 13th at the County Court, Croydon.

Company Liquidations

Maxwell Butcher & Co., Ltd., 77a, Queen Victoria Street, E.C., electrical and mechanical engineers and contractors.—At a meeting of creditors on July 8th a statement of affairs was presented disclosing liabilities of £1,045, of which £248 was due to the trade, the balance being in respect of loans and sundry accounts. The total assets were £225. It was stated that resolutions for voluntary liquidation had been passed, and Mr. F. Kilner, 179, Wardour Street, W., had been nominated liquidator. Mr. Kilner stated that the company was formed in July, 1924, with a nominal capital of £2,000; the issued capital was £1,553. The trading was successful until about three or four years ago, when the company suffered severe losses through bad debts. According to profit and loss accounts prepared the accumulated losses at July 1st last totalled £1,922. The creditors decided to confirm the voluntary liquidation of the company, with Mr. Kilner as liquidator.

John Thompson (Wolverhampton), Ltd.—Winding up voluntarily for reconstruction purposes. Liquidator, Mr. W. J. Carter, 14, Lichfield Street, Wolverhampton. This notice is formal, and all creditors have been, or will be, paid in full.

B. & B. Tate, Ltd.—Meeting August 13th at 68, Basinghall Street, E.C., to receive an account of the winding up by the liquidators, Messrs. C. L. Bunt and S. M. Benn.

Private Arrangements

W. R. Marchant, trading as "Marchant & Co.," 81, Sandgate Road, Folkestone, electrical engineer.—A meeting of the creditors herein was held on July 6th at the offices of Messrs. Josolyne Miles Page & Co., 28, King Street, E.C.2, when a statement of affairs was presented showing liabilities of £2,522, of which £2,286 was due to the trade, and there were unsecured cash creditors for £237. The net assets were £679, with a deficiency of £1,843. The debtor took over the business in 1913 and has carried it on ever since. With a view to protecting the estate, a deed of assignment had been executed to Mr. A. O. Miles, as trustee, but this deed had not yet been registered. The solicitor for the debtor stated that Mrs. Marchant had some house property, which, it was suggested, might be remortgaged, and this would assist in the provision of a proposed composition of 2s. 6d. in the £ to be paid in cash. A resolution was passed for the administration of the estate under a deed of assignment to Mr. W. A. J. Osborne, of Messrs. Corfield & Cripwell, Balfour House, Finsbury Pavement, E.C., as trustee. Subsequent to the meeting, however, an offer was made of a composition of 3s. 4d. in the £.

Smith Thompson, trading as Thompson and Gibson, Chapel Lane, Bingley, radio dealer.—The creditors herein were called together recently at Keighley, when a statement of affairs was submitted showing liabilities of £340 and assets of £126, with a deficiency of £214. The trade liabilities amounted to £220 and there were cash creditors for £120. A resolution was passed in favour of the estate being dealt with under a deed of assignment to Mr. J. W. Thompson, of Keighley, as trustee.

Electricity Supply

Lighting, Domestic, Power

Aber (Caernarvonshire).—SUPPLY SCHEME.—Overhead lines are being extended to the area by Electricity Distribution of North Wales and District, Ltd.

Accrington.—FARM SUPPLIES.—Arrangements are being made by the Electricity Committee for a mains extension to Hurstead and Ing Farms, Baxenden.

Alnwick.—VOTE ON STREET LIGHTING.—To determine which means of illumination shall be used for street lighting, the Urban District Council is taking a plebiscite among the inhabitants. Tenders for lighting have been submitted by the North-Eastern Electric Supply Co., Ltd., and the Alnwick Gas Co.

Ashton-under-Lyne.—PROGRESS OF CHANGE-OVER.—It was announced at a meeting of the Town Council that by 1942 the whole of the borough's electricity supply will be changed over from d.c. to a.c.; seven-eighths of the town has already been converted, at a cost of £67,000.

Barnoldswick.—INCREASED PROFIT.—A net profit of £1,727, the highest in the six years of the electricity undertaking's existence, is revealed in the annual accounts for 1935-36.

Burton-on-Trent.—LOANS.—The Electricity Committee is seeking sanction to borrow £44,000 for mains and services and £9,000 for transformers and switchgear.

PROPOSED SUPPLIES.—To provide supplies to Smisby and Answell the Electricity Committee is seeking a Fringe Order. The cost is estimated at £1,500. It is also proposed to provide a supply to Draycott-in-the-Clay, in the area of the Uttoxeter Urban District Council, at a cost of £2,500.

Campbeltown.—NEW GENERATING SET.—The Electricity Commissioners have given their consent to the installation of an additional 225-kW generating set in the Campbeltown power station of the Campbeltown and Mid-Argyll Electric Supply Co., Ltd.

LOWER FLAT RATE.—A reduction from 8d. to 7d. per kWh in the flat rate tariff became operative on July 1st last.

Cannock.—ELECTRICAL DEVELOPMENT.—Good progress of the electricity undertaking was reported at a meeting of the Council on Tuesday last week. The increase in energy sold for domestic purposes (49.5 per cent.) was the largest ever recorded. Sales increased from 7,581,543 to 8,423,469 kWh. The net profit for the year was £2,402, as compared with £2,913 in the previous year; concessions worth £3,000 were granted to consumers during the year, and additional charges were incurred (£1,289). About 12 miles of new mains were laid, making the total 113 miles. Consent has been obtained for an extension of the supply area to a number of parishes north of Penkridge.

Cardiff.—CONTROL OF STREET LIGHTING.—In a report to the Council by the city electrical engineer (Mr. Edward Jones) it was contended that it would be impossible to control the gas street lamps in the event of an air raid, and he suggested that the street-lighting arrangements should be transferred to the Electricity Committee. The report was adopted by the Council.

Colwyn Bay.—ILLUMINATIONS.—The Council intends to inaugurate a scheme of decorative lighting from July 25th. This will be carried out by the Electricity Department, which is offering supplies for decorative purposes during the summer months at 1d. per kWh.

East Dereham.—NEW SUPPLIES.—Mains are being extended to eighteen new houses in Jubilee Avenue, and the Council is considering the provision of supplies to farms in Westfield Road.

East Ham.—SURPLUS AS RATE RELIEF.—The Electricity Committee reports a surplus for the year of £5,477, which is to be devoted to rate relief.

Fakenham (Norfolk).—LIGHTING DEVELOPMENTS.—The Council's Lighting Committee is to consider illuminating the streets by electricity instead of by gas.

Folkestone.—ELECTRICITY FOR COUNCIL HOUSES.—The offer of the Folkestone Electricity Supply Co., Ltd., to lay service cables for the supply of electricity to sixty-seven houses to be built on the Hill Road estate has been accepted by the Council.

Fort William.—MUNICIPAL CONTROL.—The Town Council has now practically completed arrangements for becoming authorised distributors of electricity, in place of the Fort William Electric Lighting Co., which has supplied the district for forty years. The town's agreement with the company expires in July next year. Energy in bulk will be supplied to the Town Council by the Lochaber Power Co. The scheme, which is to cost £12,000, will involve the installation of transformers and the laying of cables from the power company's works two miles from Fort William.

Frome (Somerset).—ELECTRICITY FOR NEW WATER SCHEME.—On the advice of the engineers, and because of a revised quotation for electricity from the supply undertaking, the Urban District Council has decided to install electrically driven pumps for its new water scheme. The engineers, Messrs. Parker, Pearson & Ross Hooper, are inviting tenders.

Godstone.—OVERHEAD LINE PROJECTS.—The Rural District Council has consented to the erection of overhead lines at Tatsfield by the Sevenoaks and District Electricity Co., Ltd., and at Burstow by the Horley and District Electricity Supply Co., Ltd.

Gravesend.—ELECTRICITY IN THE HOME.—The Housing Committee has been asked by the Electricity Committee to insist on proper prominence being given to the advantages of electricity for all purposes in Council houses.

Hastings.—CORONATION ILLUMINATIONS.—The Finance Committee recommends an expenditure of £2,500 for decorative lighting at the time of the Coronation.

Kinver (Worcestershire).—REDUCTIONS IN CHARGES.—The S.W. & S. Power Co. has decided to reduce its charges at Kinver from the beginning of the present quarter. Residential tariff rates are being lowered from 12s. to 10s. per room per year, and the lighting flat rate from 5½d. to 5d. per kWh.

Lichfield.—LOANS.—The Electricity Committee has obtained sanction to borrow £2,196 for extensions to Sandhills and Muckley and £4,217 for mains and plant. Permission is being sought to borrow a further £10,500 for mains, services, meters and wiring.

Loddon (Norfolk).—OVERHEAD LINES APPROVED.—When Loddon Rural District Council was asked to approve Yarmouth Corporation's application for permission to erect overhead lines in certain parishes Mr. H. Williams thought the Council should insist on underground cables. He described overhead lines as unsightly and dangerous. The Rev. J. Colwell Smith also considered overhead cables to be very helpful to air-raiders, but other members declared that any such obstruction as the two members suggested would hold up necessary development and the overhead lines were approved.

London.—ST. PANCRAS.—The vitality of the Electricity Department can be gauged from the fact that the net profits to date amount to £651,062 in forty-four years. Excluding any allocation that may be made from the past year's revenue, up to the present it has contributed no less than £389,166 to the relief of rates. Concessions to consumers last year, in the form of tariff reductions, totalled £5,961.

Surprisingly enough, the maximum demand on the undertaking during the past year occurred at midday (December 23rd). Mentioning the matter in his annual report, Mr. Robert Lee, the borough electrical engineer, states that this was undoubtedly caused by the cooking load being imposed upon the undertaking at a time when it was carrying, in addition to the usual industrial supply, a very heavy lighting and heating load in consequence of the morning being dark and extremely cold. The result was an m.d. of 28,945 kW, against 27,660 kW in the preceding year. The Council encourages the use of electricity for cooking by a new tariff on the assumption that it is a morning load and normally off-peak, and it was suggested to the C.E.B. that it could not have been the original intention to bring morning loads into assessment for the m.d. charge, so hindering domestic development, and requesting that some relief should be granted. The Board declined to do this.

Additional illumination to the extent of 62,700 candle-power was provided by improvements in street lighting during the year ended March 31st last. More than 3¼ miles of main roads are now illuminated by electric-discharge lamps, of which there are 131, and further schemes have been approved for the present year. The policy of converting gas lamps to electricity when the opportunity occurs was continued, twenty-four more being changed, bringing the aggregate so far dealt with to 1,190. At the end of the financial year the number of street lamps controlled by the Department numbered 2,524 electric and 362 gas.

The total number of all-electric flats at March 31st last was 1,668, of which 509 were connected during the year. Mr. Lee states that these figures will be considerably increased in the current year as, apart from projected schemes, there are many hundreds of flats equipped for the use of electricity now in course of letting, one estate alone consisting of approximately 800 flats.

L.C.C.—The County Council is to renew the electric-lighting installation in the Bexley mental hospital at a cost of £11,500.

STOKE NEWINGTON.—In connection with new plant to be installed at the Trumans Road sub-station, underground cables are to be laid at a cost of £3,218.

Luton.—HOUSE INSTALLATIONS.—The Town Council is to have electricity installed in 172 houses, at an estimated cost of £1,670, and the rentals are to be increased by 3d. per week for a period of ten years.

Melton Mowbray.—REDUCED CHARGES.—A reduction from 8d. to 7d. per kWh in the lighting flat rate is to be made by the Melton Mowbray Electric Light Co., Ltd., while the new rate for the two-part tariff will be 50s. instead of 60s., and meter rents are to be reduced from 3s. to 2s. 6d. per quarter. These charges will come into operation on October 1st.

Morecambe.—LOAN FOR EXTENSIONS.—The Electricity Committee is applying to the Electricity Commissioners for sanction to borrow £10,000 in respect of anticipated expenditure on mains extensions.

Newcastle-under-Lyme.—PROTEST AGAINST McGOWAN RECOMMENDATION.—The electricity undertaking owned by the municipality is one of those affected by the recommendation of the Committee on Electricity Distribution that undertakings with

outputs of less than 10,000,000 kWh per annum shall be compulsory amalgamated with larger ones. The matter was referred to at the last meeting of the Council, and it was unanimously resolved to protest against the proposal and to make efforts to secure a modification.

Northern Ireland.—GENERATION OF ELECTRICITY.—An official statement furnished by the Ministry of Commerce shows that 43,317,891 kWh of electricity was generated by authorised undertakings in Northern Ireland during the quarter ended June 30th last, as compared with 35,481,782 kWh in the corresponding quarter of 1935, representing an increase of 7,836,109 kWh, or 22.1 per cent. The total amount generated during the first half of this year was 101,460,672 kWh, as compared with 81,332,861 kWh during the corresponding period of 1935, an increase of 20,127,811 kWh, or 24.7 per cent.

Nuneaton.—CHEAPER ELECTRICITY.—The operation of the electricity undertaking during the year ended March last resulted in a net profit of £5,287 as against £2,160 in 1934-35. In consequence, the Electricity Committee has decided to reduce tariffs to consumers at an estimated annual cost of £4,350.

Peterhead.—ELECTRIC STREET LIGHTING.—The Council has adopted a scheme for lighting the principal streets of the burgh by electricity, at an estimated cost of £3,806. The Peterhead Electricity Co., Ltd., is being asked to enter into a fifteen years' contract for the supply of electricity at stated rates.

Portsmouth.—CHANGE-OVER.—The Corporation has applied to the Electricity Commissioners for permission to change over the electricity supply from d.c. to a.c.

Ramsgate.—OPPOSITION TO OVERHEAD LINES.—The Town Council has decided to oppose an application by the South East Kent Electric Power Co., Ltd., for consent to the erection of overhead lines at Cliffs End.

Retford.—EXTENSIONS.—The Corporation has applied for permission to borrow £2,500 for extending supply mains to Misson and Finningley.

St. Helens.—SCHEME TO SUPPLY NEW AREA.—The Electricity Committee has adopted a scheme prepared by the borough electrical engineer for supplying electricity to so much of the Eccleston Hill area, added to the borough, as is not at present in the area of supply.

Scarborough.—CONTROL OF UNDERTAKING.—Consideration of the suggested sale of the electricity undertaking has been deferred by the Town Council.

STREET LIGHTING.—The Town Council has applied for sanction to borrow £5,000 for the provision of electric lighting standards, equipment, &c.

EXTENSION OF SUPPLY.—The village of Staintondale is to be connected to the Corporation's network.

AGREEMENTS APPROVED.—Approval has been given by the Town Council to conditions arranged by a special committee regarding the supply of electricity in bulk by the Corporation to the Buckrose Light & Power Co., Ltd., and an agreement with the Central Electricity Board on the operation of the Council's generating station.

AMENDED CHARGES.—Changes are being made as from the current quarter in certain electricity charges. The flat rate for lighting will be 6d. per kWh, while for prepayment meters the charge will be 6½d. Under the "all in" tariff, scale "A," the rate is to be 9s. a quarter for houses up to 800 sq. ft., rising to £6 1s. for houses from 11,001 sq. ft. to 12,000 sq. ft., plus ½d. per kWh. The fixed charge for shops, offices, hotels, factories and other premises not covered by other scales will be £10 10s. per kW for the first 20 kW, and £6 per kW above that amount, with ½d. per kWh for all energy consumed. Rates of discount are unchanged.

Shipley.—MUNICIPAL TRADING RESULTS.—A profit of £3,211 for the year ended March 31st last is reported by the Electricity Department, and a deficit of £1,173 by the Gas Department.

Skipton.—LARGE EXPANSION.—Nearly 50 per cent. more kWh sold than in the previous year, an increase of 14.6 per cent. in the number of consumers, and the successful inauguration of new showrooms are some of the achievements during 1935-36 of the Skipton Electricity Department, of which Mr. W. V. Smythe is the electrical engineer. Energy sold amounted to 2,483,480 kWh against 1,659,457 kWh, and the number of consumers at the end of the period was 2,698 (2,354). The greater proportionate increase in consumption than in consumers is partly due to propaganda at the new showrooms.

Southborough (Kent).—ROAD LIGHTING.—The tender of the Tunbridge Wells Electricity Department for lighting the main road has been accepted by the Urban District Council. Other roads are being lighted by gas.

South Shields.—ARRANGEMENTS FOR ILLUMINATIONS.—The annual display of illuminations will take place in the South Marine Park from August 31st to September 12th.

Stoke-on-Trent.—A SUCCESSFUL YEAR.—An increase of 12 million kWh sold and 9,000 new consumers is reported by the Stoke-on-Trent city electrical engineer (Mr. C. H. Yeaman) in his annual report on the operation of the city's electricity undertaking. Income increased by £28,000 to £325,000, and expenditure by £40,000 to £290,000, a surplus of £10,884 being carried to reserve. This result has been attained in spite of reduced tariffs that cost the department about £11,000, while a quarter of a million pounds was spent on extensions to mains and equipment during 1935. Further reductions in tariffs just approved by the Council will cost another £12,600, making an aggregate of £23,000 in two years. During the year more than 4,000 households were connected under the assisted wiring schemes, while the number of electric cookers installed on simple hire was more than doubled. Nearly one-third of the consumers received their supplies through slot meters.

ELECTRIC KILNS.—Two additional kilns were connected to the Electricity Department's mains during 1935-36, states Mr. C. H. Yeaman. This made the number of electric kilns in commercial operation fifteen, which consumed 7,223,669 kWh (9.35 per cent. increase). Mr. Yeaman adds that these kilns are used for enamel firing for decorating purposes with a large measure of success. Research work is proceeding with a view to applying electricity to glost firing, in which higher temperatures are necessary, and ultimately there is the problem of biscuit firing. There is thus considerable scope for development in the pottery industry.

Stokesley (Yorks).—MALTBY SUPPLY.—Plans submitted by the North-Eastern Electric Supply Co., Ltd., for extending the overhead network to Maltby have been approved by the Rural District Council.

Sunderland.—"OUTSIDE" STREET LIGHTING.—The Town Council has been in negotiation with the North-Eastern Electric Supply Co., Ltd., regarding the electric street lighting of

Impressive Birmingham Figures

ALTHOUGH the proportionate expansion in kWh sold by the Birmingham Electric Supply Department (engineer, Mr. F. Forrest) during the past year is not so high as in some of the less well-developed undertakings, it represents an actual increase of no less than 62½ million kWh. As this follows an improvement of 56½ million kWh in the previous year, it may be considered very satisfactory.

The quantity of electricity sold within the undertaking in the year ended March 31st last was 615¾ million kWh, which constitutes it the largest municipally owned supply authority in the country. In addition to these sales, nearly 82 million kWh was supplied to the Central Electricity Board.

Additional loan capital raised during the year, mainly in order to finance extensions at the Hams Hall generating station and distribution requirements consequent upon expansion of the supply, amounted to £1,606,640, the amount actually expended being £1,640,564 (net). Capital redeemed in the same period was £393,273. The total capital raised to date for the purposes of the undertaking is £15,450,146, of which £5,821,703 (equal to 37.68 per cent.) has been redeemed.

Expenditure on revenue account amounted to £1,831,119, including £112,638 in respect of the change of system and voltage. The balance carried to net revenue account, after allowing for miscellaneous receipts, is £781,926, and after meeting capital charges, income tax, &c., the surplus on the year's working amounts to £255,341, as compared with £257,553 in the previous year. After deducting special items of a capital nature amounting to £139,540 (net), there is a balance for the year of £115,801, which has been carried to the reserve fund.

Further progress has been made during the year on the work of changing over from d.c. to a.c., and of increasing the pressure of supply on high-voltage transmission. The cost of these works on the consumers' premises, including new meters and service alterations, since a commencement was made four years ago is £404,553. The whole of the expenditure to date on this account has been liquidated. Standardisation of frequency in accordance with the Central England Electricity Scheme has been continuously proceeding, and £1,900,000 has now been expended on this work.

Satisfactory all-round progress has been made during the year, 20,074 new consumers having been connected, bringing the total number at March last to 182,259. The new load connected in the form of current-consuming apparatus aggregated 69,226 kW, which brings the total connections to date to 663,684 kW. The assisted wiring and hire-purchase schemes continue to make steady progress. A survey of the past five years shows that the annual quantity sold has increased by 71.09 per cent., the number of consumers by 84.17 per cent., and the connected load by 75.88 per cent.

Additional capital expenditure is necessary to finance general mains extensions in consequence of the continued expansion of the undertaking, and it is calculated that £350,000 will be expended during the period ending September, 1937. Since March, 1935, 380 miles of transmission and distribution cables have been laid to meet the Committee's statutory obligation to provide supplies of electricity and to cope with new business in the area.

Two of the three 50,000-kW turbo-alternators, the installation of which was authorised by the Council on July 31st, 1934, October 16th, 1934, and December 10th, 1935, together with ancillary plant and buildings, are now in an advanced stage of construction at the Hams Hall power station. One is due to be put into service this month (July), and in October a second set should be in commission, making a total installed generating plant capacity of 190,000 kW at the Hams Hall station.

Two electro-filter plants have been installed and dust emission has been practically eliminated.

areas added to the borough but in the supply area of the company, and has been informed that it has no objection to the Council supplying electricity for street lighting along tram routes.

Swansea.—NEW TRANSMISSION LINES.—The Corporation Finance Committee has approved a proposal of the borough electrical enginer (Mr. J. W. Burr) to spend £19,045 on works in connection with the supply to the South Wales Electrical Power Distribution Co. for the Amalgamated Anthracite Collieries, involving the construction of overhead transmission lines. The present supply is about six million kWh per annum, and the new total will be approximately 18 million kWh.

Switzerland.—A NOTABLE RECTIFIER INSTALLATION.—A contract for the complete electrical equipment of a mercury rectifier station for a new aluminium electrolysis plant at Rheinfelden, Switzerland, for the Aluminium Industrie Gesellschaft, of Neuhausen, has been placed with the Brown-Boveri Co. The contract comprises eight heavy-current rectifiers to deliver a total of 44,000 A at 600 V, corresponding to an output of 26,400 kW. Each pair of rectifiers will form a set to give 11,000 A, each set having its own 9,000-kVA supplying transformer. The necessary three-phase power will be supplied by two 18,000 kVA 125/20/5 kV three-winding transformers with built-in tap changers and regulated on the 20-kV side.

Thirsk.—RURAL ELECTRIFICATION.—The Electricity Commissioners have informed the Rural District Council that they are satisfied that the North Eastern Electric Supply Co., Ltd., is doing all it can to electrify its area, and that they do not feel justified in pressing the company to extend its mains to the remaining villages in the rural district at the present time, having regard to the sparsely populated nature of the district. One of the Commission's engineering inspectors visited the area.

Torquay.—SUPPLY TO AVONWICK.—The Electricity Committee is to provide a supply to Avonwick, at a cost of £1,300.

STREET LIGHTING IMPROVEMENT.—The Corporation has obtained sanction to borrow £5,850 for street lighting.

Upton-on-Severn.—CONSENT TO OVERHEAD LINES.—The Rural District Council has decided to raise no objection to overhead lines being erected at Hanley Swan by the Shropshire, Worcestershire & Staffordshire Electric Power Co.

Uttoxeter.—REDUCED ELECTRICITY CHARGES.—Various concessions are being granted to consumers, including ¼d. reduction in the lighting flat rate.

Watton.—STREET LIGHTING.—Street lighting has been extended to the Railway Crossing and Station Yard by the East Anglian Electric Supply Co.

Whitby.—UNDERTAKING'S FUTURE.—Following the receipt of a letter from the company, the Urban District Council has decided to defer consideration of a proposal to sell its electricity undertaking to the Centropolis Public Works Co., Ltd.

NIGHTLY ILLUMINATIONS.—Arrangements are being made by the Council for its annual illuminations. This year they will be used nightly instead of on alternate nights as was the case last year.

Wigan.—CHEAPER ELECTRICITY.—The Town Council has reduced its charges as under: Lighting, in the borough, from 3¾d. to 3½d. per kWh for the first 1,000 kWh per annum, and for all in excess from 1½d. to 1d. per kWh; in the outer districts the charges are to be 4d. and 1½d. respectively. Power: A new charge of ¾d. per kWh for consumptions in excess of 6,000 kWh per quarter in Wigan and Ince, and a rate of 1d. per kWh for all above 1,000 kWh per quarter in other districts.

Wolverhampton.—PROFIT LEADS TO CONCESSIONS.—In view of the favourable working of the undertaking in the past year, it is proposed to reduce charges to the extent of approximately £18,180 in a year. A rebate of 5 per cent. on accounts for electricity for the year ended March 31st last is recommended in addition to the reductions, and this, it is estimated, will benefit consumers by £12,700.

Workington.—STREET LIGHTING.—The Electricity Committee has asked the Streets Committee to allocate a street lighting area to the Electricity Department for the purpose of experimenting in street lighting by electricity.

Worthing.—ELECTRICITY FOR FLATS.—The Electricity Committee is to provide a supply to the Winchelsea Court flats at a cost of £2,070.

Wrexham.—COST OF TRANSMISSION.—A resolution has been adopted by the Council urging the North Wales and South Cheshire J.E.A. to make renewed representations to the Electricity Commissioners for the acquisition by the Central Electricity Board of transmission lines in the area of the J.E.A. so as to relieve authorised undertakings of the whole of the cost of transmission of electricity in North Wales and South Cheshire, as well as of contributing towards the cost of transmission in north-west England. If a satisfactory reply is not received within three months the Council will consider what alternative steps should be taken for the removal of the inequalities complained of so far as Wrexham is concerned. The alternative step would, it is understood, comprise the installation of two Diesel engine generating sets.

York.—REDUCED CHARGES.—For the summer months of this year reduced charges are operating. One concession by the Electricity Committee is the institution of a ¼d. "unit" rate in place of ½d. under the rateable value system.

Traction

India.—EXTENSION OF RAILWAY ELECTRIFICATION.—The work of electrifying the section of the Bombay, Baroda and Central Indian railway from Borivli to Virar, a distance of sixteen miles, is proceeding apace, and the line is expected to be in full operation next month. The total gross outlay involved is estimated at Rs.2,500,000, and as a result of electrification an annual saving of about Rs.120,000 is anticipated. Tata & Sons are erecting the 22,000 V transmission lines which will supply the power to the sub-station at Bassein Road.

Italy.—MERCURY RECTIFIERS FOR RAILWAY TRACTION.—In view of the heavy traffic on the electric railway between Milan and Varese, mercury rectifiers are being substituted for rotary convertors at many of the sub-stations. A rectifier set recently installed at a sub-station at Albizzate embodies unusual features. Its continuous rating is 2,000 A at 750 V; it is of the two-chamber type, each cylinder with six anodes, arranged in a common cooling jacket. The design is such that a very high overload capacity is combined with an increased reserve because the service can be maintained by six anodes only. As a result of the splitting up of the power the losses in the arc are very low, and another feature is that the rectifier is capable of working, without modification, at 3,000 V d.c. by providing grid control for both pressures. The ignition and the excitation of both chambers is automatic, and the cathode switch closes automatically when the master switch is closed. The pump and electric gauge for the control of the vacuum are common to both chambers.

Manchester.—"TUBE" DEADLOCK REPORTED.—According to the *Daily Dispatch*, railway officials are of opinion that a Manchester "tube" can only be achieved by merging all the area transport interests (municipal, rail and private) on the lines of the London Passenger Transport Board. After a meeting of the Corporation Underground Railway Committee and railway representatives on Monday it was announced that no further progress had been made. The *Daily Dispatch* understands that the railways decline to submit any electrification proposals until the possibilities of co-ordinating all transport interests in the area have been fully investigated. On the other hand, the committee maintains that electrification must be discussed first, so that the authorities concerned can be approached with definite proposals. The railways have suggested that the first step should be a meeting of representatives of authorities within a 15-mile radius of Manchester. In view of the lack of interest in the proposed South-East Lancashire municipal transport merger, however, this is not regarded as hopeful.

South Africa.—ELECTRIC RAILCARS.—Approval has been given to the purchase of two electric railcars for service on the Durban-Pietermaritzburg section of the South African Railways, learns *Reuter's Trade Service* from Capetown. The cars will be equipped with air-conditioning plant and a buffet counter for serving light refreshments. It is proposed to run fast services taking not more than two hours and with probably only one stop (Cato Ridge) between Durban and Pietermaritzburg.

United States.—DIESEL-ELECTRIC OMNIBUSES.—There are a number of buses of the petrol-electric type in use in America, but so far the combination of a Diesel engine and electric generator has been confined practically to railway transport. However, following a series of tests covering six years, Public Service Co-ordinated Transport has decided to introduce a fleet of Diesel-electric buses and has placed an order with the General Motors Truck Corporation for twenty-seven omnibuses so powered, states *Mass Transportation*. The engine and generator will be mounted at the rear. Electrical equipment is to be furnished by the American G.E. Company.

Communications

Great Britain.—A MOBILE POST OFFICE.—It is reported in the *Post Office Electrical Engineers' Journal* that arrangements are in hand for the provision of a mobile post office for use at race meetings, &c. This will probably be mounted on a special trailer chassis towed by a Morris 3-ton tractor unit, and will contain, among other apparatus, two telephone cabinets and teleprinter plant. It will be equipped with its own generating plant to provide power for the transmitting instruments.

RADIO RELAY SERVICE FOR TYNEMOUTH.—Northern Rediffusion Services, Ltd., which operates a radio relay system at Newcastle-on-Tyne, Gateshead and Whitley Bay, is to commence a similar service at Tynemouth. An agreement for a period of ten years has been entered into with the Council, to be terminable subsequently by twelve months' notice by either party.

RADIO EXPERIMENTS AT A COLLIERY.—It is reported in the *Daily Telegraph* that experiments with ultra-short-wave radio reception and transmission were made at the Betteshanger Colliery of Messrs. Pearson and Dorman Long, near Deal, last week-end. A wavelength of 4½ metres was used, and two-way communication was established between the pithead and the electricity sub-station at the bottom of the 2,160-ft. shaft. The intention was to demonstrate how radio might be used for mine rescue work and general communication purposes.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Australia.—MELBOURNE.—August 5th. Victorian Railways. Armoured cable. (T.Y. 30407.)*

November 18th. Supervisory control equipment for manual and automatic traction sub-stations, tie stations and complete control desk and diagram panel with accessories. (T. 30402.)*

August 19th. State Rivers and Water Supply Commission. One 60-kVA and two 1,000-kVA transformers. (T.Y. 30441.)*

VICTORIA.—August 18th. State Electricity Commission. Electrically operated high dredger for brown coal. Agent-General for Victoria, Victoria House, Melbourne Place, Strand, London, W.C.2 (deposit £2).

Batley.—July 24th. Borough Council. Two 200-kVA (alternatively two 250-kVA) transformers for indoor sub-stations, also house service a.c. meters. (July 10th.)

Blackpool.—July 28th. Borough Council. Annual contracts for 1936-37, including electrical sundries. (July 10th.)

Bridgend.—July 28th. U.D.C. Electricity Department. Two 200-kVA transformer kiosks complete. (July 10.)

Brighton.—July 30th. Borough Council. One steam driven and two electrically driven boiler-feed pumps for the Southwick power station. (July 10th.)

Canterbury.—July 25th. Town Council. Heating plant, comprising electrical thermal storage or coke boilers, calorifiers and other apparatus for a public baths scheme. H. M. Enderby, city engineer, Municipal Buildings (deposit £2 2s.).

Colwyn Bay.—July 21st. Town Council. Conversion of the electrical machinery at the laundry owing to the change-over of the supply from d.c. to a.c. Electrical engineer, Electricity Offices, Penrhyn Road.

Darlington.—July 22nd. Corporation. 6,000/400-V transformers. (See this issue.)

East Grinstead.—July 21st. U.D.C. 2,000 yd. of cable with shaped conductors, 500 yd. of cable with circular conductors, and supply of cable for twelve months. (July 10th.)

Fife.—July 27th. County Council. Electrical installations in 212 houses at Kelty. C. R. Douglas and Son, surveyors, Dunfermline (deposit £1 1s.).

Finchley—July 27th. Borough Council Metal-clad, air-insulated, l.v. switchgear. (July 3rd.)

Gloucester.—Electricity Department. 11-kV switchgear and one 100-kVA, four 200-kVA and two 300-kVA transformers. (July 10th.)

Halifax.—July 21st. Housing Committee. Various works, including electrical, at thirty houses on the Sandbeds Farm estate. D. T. Lloyd Jones, borough engineer, Crossley Street (deposit £2 2s.).

Hull.—July 22nd. Education Committee. Electric wiring, fittings, &c., at the Thoresby Street school. R. C. Moore, Education Offices, Guildhall (deposit £2).

July 27th. Transport Committee. Twenty-six composite construction, double-deck fully enclosed, trolley-bus bodies seating fifty-six passengers, with chassis. J. Lawson, general manager, Transport Offices, Ferensway.

Kingston-upon-Thames.—July 18th. Corporation. Street lighting equipment. (July 3rd.)

Kirkcaldy.—July 24th. Borough Council. E.h.v. switchgear, transformers and equipment for static sub-station and kiosk. (July 10th.)

Loanhead (MIDLOTHIAN).—July 30th. Borough Council. Electric lighting, &c., at sixty-two houses. Deas & Bertram, architects, Central Chambers, High Street, Kirkcaldy.

London.—ISLINGTON.—July 24th. Borough Council. Stores and materials for electrical installations. (July 3rd.)

COMMISSIONERS OF H.M. WORKS.—July 23rd. Electrical accessories. (July 10th.)

July 31st. Electric wiring at Welsh Board of Health, Cardiff. (See this issue.)

July 23rd. Committee of Governors. Electrical installation for lighting and cooking at a proposed convalescent home. J. C. Elford, quantity surveyor, Liverpool House, Middlesex Street, E.1 (deposit £2 2s.).

Manchester.—July 27th. Electricity Committee. Cable. (See this issue.)

Middlesbrough.—July 20th. Corporation. Twelve months' supply of 660-V and 11,000-V, p.i., l.c. double hessian taped cables. (July 3rd.)

Middlesex.—August 26th. County Council. Electrical installation at Shenley Mental Hospital. (See this issue.)

New Zealand.—PUBLIC WORKS DEPARTMENT.—September 8th. 1,550 ft. of 11,000-V cables and cable boxes, wall bushings and studs. (T.Y. 30506.)*

Northern Ireland.—BELFAST.—August 7th. Electricity Committee. Auto-transformer, battery-driven rail locomotive, feed-water meter, three-phase, l.v., high-rupturing capacity switchgear and five hydrants, oil fire extinguishing equipment, and portable fire extinguishers. (See this issue.)

August 10th. Town Council. One electrically driven centrifugal pump, with switchgear, piping, &c. City Surveyor's Department, Drainage Section, Room 94, City Hall.

Portsmouth.—July 20th. Town Council. Stand-by pumping plant at Eastney pumping station consisting of two centrifugal pumps with motors, starters, mains, &c. J. Parkin, city engineer, Guildhall (deposit £3 3s.).

Preston.—July 24th. Corporation. Wiring for electric lighting at the Preston Institution, Fulwood. (July 10th.)

July 23rd. Town Council. Two additional vertical spindle, electrically driven sewage pumps, one heavy-oil engine, alternator and switchboard for additions and alterations to the machinery at the sewage pumping station (Contract No. 3). Borough engineer, Municipal Buildings (deposit £2 2s.).

Rosehearty (ABERDEENSHIRE).—July 21st. Town Council. Electric lighting at housing estate. Jenkins & Marr, architects, 16, Bridge Street, Aberdeen.

Selkirk.—July 20th. County Council. Electrical and heating work in connection with new school at Galashiels. J. C. Hall, master of works, Galashiels.

South Africa.—PRETORIA.—August 7th. Union Tenders and Supplies Board. Workshop machinery and tools. (T. 30418.)*

August 6th. City Council. Power cables, cable and jointing boxes, transformers and switchgear, including 12,000-V and 6,600-V panels for transformers and feeders, &c. (T.Y. 30470.)*

JOHANNESBURG.—August 31st. Railways and Harbours Administration. Forty-eight traction motors for electric locomotives. (T.Y. 30423.)*

August 14th. Rand Water Board. Two electric motor-driven elevators and four electric motor-driven belt conveyors for coal handling, with control gear, &c. (T.Y. 30434.)*

August 20th. City Council. H.v. switchgear and accessories, including control panels. (T.Y. 30468.)*

Stockton-on-Tees.—July 20th. Electricity Department. 11,000-V three-phase switchgear, l.v. sub-station switchgear, and two 750-kVA outdoor transformers. (July 3rd.)

Stretford.—July 27th. Education Authority. Various works, including heating engineering and electrical installations, at a new school, Lostock. P. Howard, architect, 88, Moseley Street, Manchester (deposit £1).

Tiverton.—July 24th. Town Council. Steel kiosk, e.h.v. switchgear and l.v. isolators and transformers. (See this issue.)

Uruguay.—MONTEVIDEO.—August 14th. State Electricity Works. Electrical materials. (T.Y. 30389.)*

August 27th. Fifteen 6,000/200-V sub-station transformer equipments. (T.Y. 30437.)*

Warwickshire.—July 29th. County Council. Heating and electrical work. (See this issue.)

West Lothian.—July 18th. County Council. Electrical work at twenty-six houses at Dalmeny. F. Smith & Brown, 4, Regent Street, Hamilton.

Workington.—July 20th. Town Council. Duplicate set of electrically driven pumps and motors in connection with the Stainburn sewerage scheme. J. Penman, borough surveyor, Town Hall.

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Barrow-in-Furness.—Electricity Committee. Accepted. 70-h.p. motor (£122).—Met.-Vick. Elecl. Co.

Chesterfield.—R.D.C. Accepted. Electrical installation at new offices (£623).—H. Barker, Ltd. (Nottingham). Electric lift (£542).—Etchells, Congdon & Muir, Ltd. (Manchester).

Cradley Heath.—Upper Stour Valley Main Sewerage Board. Accepted. Electric compressor (£183).—Broom & Wade, Ltd.

East Ham.—Electricity Committee. Recommended. Sub-station switchgear (£414).—Crompton Parkinson, Ltd.

Gravesend.—Electricity Committee. Recommended. Construction of overhead lines (£1,333).—Henley's. Battery repairs (£313).—Tudor Accumulator Co.

Hastings.—Electricity Committee. Recommended. Switch and transformer kiosk (£699).—Ferguson Pailin, Ltd. Switchgear for flats at Marina (£712).—Crompton Parkinson, Ltd. Switchgear for Icklesham sub-station (£166).—A. Reyrolle & Co.

Lichfield.—Electricity Committee. Accepted. Twelve months' supplies of the following: P.i. cables.—Standard Telephones. Poles for l.v. distribution.—Calders, Ltd. Overhead line conductors.—Henley's. Lamps for street lighting.—G.E.C.

London.—L.C.C. Housing and Public Health Committee. Wiring and fittings for electric lighting, &c., in about 780 existing houses and flats at Becontree (Dagenham area No. 8 contract):

	£
T. B. Watson & Son. Accepted	**6,741**
Ryland's Electrical Co. ...	7,210
Malcolm and Allan (London), Ltd.	7,936
Evans and Shea...	8,000
Springvale Electrical Co. ...	8,123
Holliday, Hall and Stinson, Ltd.	8,145
Buchanan and Curwen, Ltd. ...	8,535
Samuel Reed & Sons	8,593
Archibald Meckhonik	8,619
Davis Myer & Co.	8,622
R. C. Cutting & Co.	8,623
B. French, Ltd.	8,632
Electrical Installations, Ltd. ...	8,634
W. J. Furse & Co. (London), Ltd.	8,646
G. E. Taylor & Co.	8,664
T. Clarke & Co.	8,706
Fillis and Ward, Ltd.	8,942
Alexander Hawkins & Sons ...	8,981
A. Dean & Co.	9,464
Jacob, White & Co.	10,063
G. E. Thomas	10,068
Anderson, Angell & Co. ...	10,224
Pinching and Walton	10,260

The chief engineer's comparable estimate is £7,420.

Malvern.—U.D.C. Accepted. Wiring houses for electric lighting at Malvern Link.—H. F. Jenkins. Alteration and replacement of consumers' apparatus and lamps, owing to the change-over.—Abell & Smith's Electrical Co.; A. F. Evans, Ltd.

Middlesbrough.—Town Council. Accepted. Three transformers for the electricity undertaking.—Electric Construction Co.

Sutton Coldfield.—Town Council. Accepted. E.h.v. and l.v. switchgear, transformer kiosks and transformers (£3,022).—G.E.C.

Swansea.—Highways Committee. Accepted. Lamps, lanterns and equipment (£460).—W. H. Stone & Co. Lamp standards and brackets (£652).—Newport & South Wales Tube Co.

West Hartlepool.—Town Council. Accepted. 300-kW, 6,600/460-V transformer.—Ferranti, Ltd.

Wolverhampton.—Electricity Committee. Accepted. 100-kVA transformer (£165).—Electric Construction Co. Switchboard extensions at the School Street sub-station (£369).—George Ellison.

Notes

An I.E.E. Paris Visit

About thirty members of the Transmission Section of the Institution of Electrical Engineers are to visit Paris this week-end. They are leaving London this evening (Friday) and on Saturday morning will take part in an informal discussion at the Office Centrale Electrique, the propaganda centre of the Compagnie Parisienne de Distribution d'Electricité. Three short talks in English by French engineers will deal with (*a*) power supply in the Paris area and the interconnection of the steam power stations with the incoming feeders from hydraulic sources by 220-kV lines; (*b*) organisation of distribution in Paris; (*c*) commercial subjects—the development of the sale of electricity, particularly with regard to domestic consumption. Afterwards the domestic appliance showrooms and other departments of the Office Centrale will be inspected.

The Société Française des Electriciens will entertain the party at luncheon on Saturday, and during the afternoon motor coach visits are to be paid to the Ampère sub-station of the Société "Inter-Paris" at St. Denis (incoming 220-kV oil-filled cable terminating the overhead line from Creney, with 220/60 kV transformers); and also to the "St. Denis II" steam power station belonging to the "Electricité de Paris" (three 72,000-kVA 3,000-r.p.m. generators with high-pressure boilers). Sunday morning will be free and after a buffet luncheon as the guests of the Société de Transport d'Energie de l'Ile de France the party will travel by railcar to that company's power station at Creney, near Troyes, which contains a synchronous condenser and inductances for voltage regulation, and interconnects three 220-kV lines. The return journey to London will be made during Sunday night.

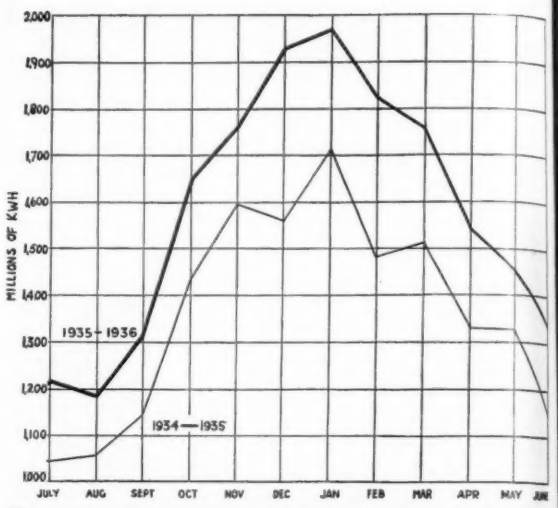
A.S.E.E. Visit

A large party of members of the Manchester Branch of the Association of Supervising Electrical Engineers paid a visit to the ventilating and control plant of the Mersey Tunnel, Liverpool, on July 4th. The visitors inspected the ventilating fans and electrical apparatus at North John Street ventilating station and the recording and control gear at the St. George's Dock control station.

Generation of Electricity in June

The official returns rendered to the Electricity Commissioners show that 1,334 kWh of electricity was generated by authorised undertakings in Great Britain during June last, as compared with the revised figure of 1,147 million kWh in the corresponding month of 1935, representing an increase of 187 million kWh, or 16.3 per cent. The number of working days in the month (*i.e.*, excluding Sundays and Bank Holidays) was 25 as against 24 last year.

During the first six months of 1936 up to the end of June the total amount of electricity generated by authorised undertakers was 9,891 million kWh, as compared with the revised figure of 8,503 million kWh for the corresponding period of 1935, representing an increase of 1,388 million kWh, or 16.3 per cent.



The output of authorised undertakings in the twelve months to the end of May last, with comparative curve for 1934-35

Appointments Vacant

Borough electrical engineer and superintendent of the Public Lighting Department for the Eccles Corporation.

Visiting teachers for electrical installation work and electrical engineering at the Borough Polytechnic, S.E.

Assistant mains engineer for Eastbourne Electricity Department.

Lecturer in the Department of Electrical Engineering, University of Birmingham.

Consumers' engineer for the Dumfries County Council.

Sales and showroom manager and cook-demonstrator (female) for the Stretford and District Electricity Board.

Showroom manager for Dorchester Electricity Department.

Scientific officer (civilian) in the Admiralty Scientific Pool.

Technical officer at the Royal Aircraft Establishment, South Farnborough, and temporary electrical engineering assistants in the drawing office for the Air Ministry.

Assistant electrical engineer at the India Store Department, London.

Mains superintendent for Worthing Electricity Department.

(See our classified advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

ASLETT condensers.
KLEXIT vacuum ash appliance.
Torch cases of metal or bakelite.
A brass-lined bakelite lampholder marked "T-35-M."

Readers should enclose stamped addressed envelopes when making their inquiries.

A Handsome Sub-station

A SUB-STATION in Marine Park Gardens in Bognor Regis has recently been put into commission. Owing to the ornamental nature of the gardens, a low building harmonising with other small buildings was designed by the borough surveyor, Mr. J. Draper. The low roof is approached by two short flights of stone steps, and the building is completely surrounded on three sides by shrubs and a rockery garden, while on the north side is a shelter. From the seats placed on top of the building an excellent view of the sea, pier and garden putting green is obtained. The interior dimensions of the sub-station are 20 ft. by 12 ft. At the outset considerable difficulty was experienced with the foundations as running sand was encountered, the depth being 10 ft. below the level of the promenade and considerably below high-water mark. By encasing the entire building within a thick layer of asphalt a perfectly dry interior was obtained. There are twelve large ventilators of the adjustable flap type. No noise is noticeable. The cutting and looping in of the 11-kV trunk main feeding the town was done over the week-end.

The sub-station in the Marine Park Gardens, Bognor Regis

This sub-station now feeds into an entirely new low-voltage network which supplies the rapidly growing west end of Bognor, the cables all being brought in from the top of the building. Choice of high-voltage switchgear was influenced by the limited space available, and was supplied by Messrs. Ferguson Pailin, Ltd. A 500-kW transformer with automatic regulation was supplied by the Hackbridge Construction Co., and a unit-type low-voltage switchboard by Messrs. Lucy & Co. The electrical engineer to the Bognor Gas and Electricity Co., Mr. H. A. Harding, was responsible for the general interior and layout. Negotiations are in progress for a larger trunk main from Chichester, from whom the bulk supply is purchased indirectly, the scheme being to link up eventually with the grid station at Wymering.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. C. J. O Garrard, whose article on "Low-voltage Distribution Systems" appears on page 82, was educated at King Edward VI School, Birmingham, and obtained the Birmingham M.Sc. degree for work on mercury-arc rectifiers. He was apprenticed to the General Electric Co., Ltd., Witton, and spent two years with Brown, Boveri & Cie., Mannheim, Germany, in the Central Station and Switchgear Departments. For three years he was with the Société d'Usinage de Matériel Electrique, Paris, engaged on metal-clad switchgear and automatic control apparatus, and since 1934 he has been an engineer in the Engineering and Switchgear Departments of the General Electric Co., Ltd., at Witton, Birmingham. He is an A.M.I.E.E., and he was awarded the I.E.E. Students' Premium in 1928.

Mr. C. J. O. Garrard

Mr. A. R. Metelerkamp, electrical engineer to the Municipality of Bulawayo and, previously, of Salisbury, has been appointed chairman of a commission set up to co-ordinate the supply of electricity for the whole of Southern Rhodesia.

The result of the ballot to fill the vacancies which will occur in the Council of the Institution of Electrical Engineers on September 30th next is as follows:—President, Mr. H. T. Young; Vice-president, Mr. Johnstone Wright; Hon. Treasurer, Mr. F. W. Crawter; Ordinary Members of Council, Members—Messrs. T. Carter, C. E. Fairburn, M.A., F. Forrest, S. W. Melsom and P. J. Robinson, M.Eng.; Associate Member—Mr. C. R. Westlake; Associate—Mr. E. M. Lee.

Dr. P. Dunsheath, O.B.E., M.A., has been elected chairman of the Transmission Section of the Institution of Electrical Engineers for the 1936-37 session.

Miss K. Martin, of Exeter, has been appointed demonstrator and showroom assistant at the new electricity showrooms of the Luton Corporation at a commencing salary of £200 per annum; and **Mr. D. Turnell,** of Cheltenham, has been appointed showroom salesman, also at a commencing salary of £200 a year.

Mr. J. C. David, of the staff of the Llanelly & District Electric Supply Co., Ltd., who was recently married, has been presented by his colleagues with a sideboard.

Mr. F. Clark, commercial assistant, and **Mr. A. G. Burbridge,** mains superintendent, have been appointed to take joint charge of the Eccles electricity undertaking, pending the appointment of a new borough electrical engineer.

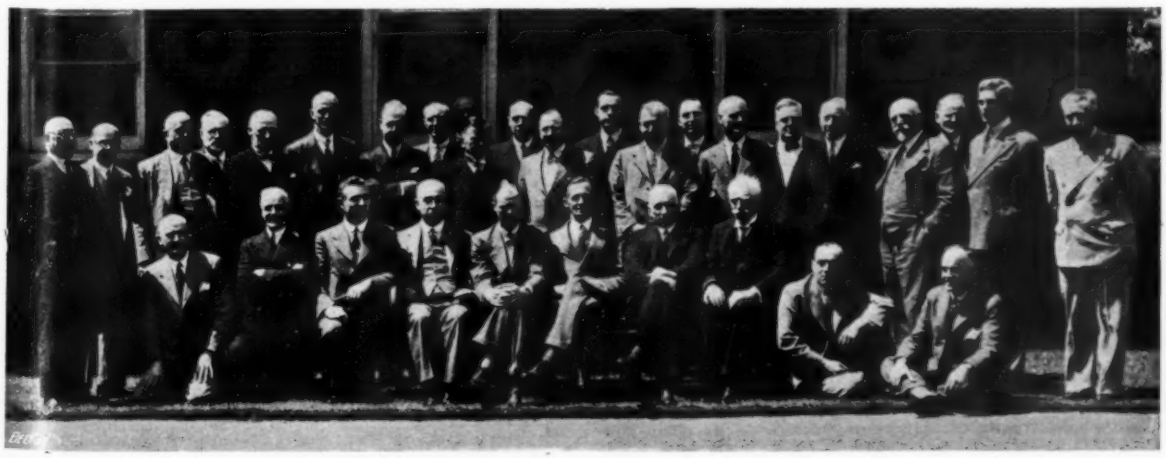
Mr. R. V. Ripley, A.M.I.E.E., who was with the Gramophone Co., Ltd., for many years as recording engineer, service manager, export engineer and purchasing engineer, and who recently joined Pye Radio, Ltd., is making a tour of the world studying the technical and commercial requirements of export markets for radio and domestic appliances. He will be accompanied by Mrs. V. Ripley, B.Sc., who has contributed articles on domestic electrical subjects to the ELECTRICAL REVIEW.

Mr. R. V. Ripley

Mr. C. W. Emanuel, deputy mains superintendent with the Watford Corporation Electricity Department, has been appointed engineer and manager of the Workington Corporation Electricity Department. Mr. Emanuel was educated at St. Bees School, Cumberland, and received his electrical training at Faraday House. During the war he served on the Western Front with the Royal Engineers. Before going to Watford in 1923 he had held positions at Hendon and Earl's Court. He is an associate member of the Institution of Electrical Engineers.

Presentations were made recently from the Farnworth U.D.C. Electricity Department staff to the chief engineer, **Mr. A. J. Hutchinson** and Mrs. Hutchinson, on the occasion of their silver wedding; to **Mr. J. H. Nuttall,** chief clerk, on his retirement after nineteen years' service; and to **Mr. H. Booth,** on his forthcoming marriage. Councillor Dr. Sessions, vice-chairman of the Electricity Committee, on behalf of the staff, presented Mr. and Mrs. Hutchinson with an electric standard reading lamp, and congratulated them. He also paid tribute to Mr. Hutchinson for the successful position of the undertaking. In response, Mrs. Hutchinson thanked the staff for the many kindnesses shown to them. Mr. A. J. Hutchinson made the presentations to Mr. J. H. Nuttall and Mr. H. Booth.

Mr. A. G. Beaver, managing director of the Sun Electrical Co., Ltd., who recently underwent a serious operation and who for the past six weeks has been in a nursing home, is now convalescing at Eastbourne.



The Council of the Electrical Contractors' and Allied Associations

Mr. A. B. Randall, engineer and manager of the Salisbury Electric Light & Supply Co., Ltd., announces that he is retiring next March, and that he will be succeeded by **Mr. R. A. McCulloch,** his chief assistant.

Among the nominations to Leverhulme Research Fellowships are those of **Mr. F. R. Perry,** M.Sc., Manc., a member of the Research Department of the Metropolitan-Vickers Electrical Co., Ltd., Manchester, for the study of overvoltages due to lightning on transmission lines (renewal of present fellowship), and **Mr. A. L. Reimann,** Ph.D., Berlin, D.Sc., Adelaide, research physicist with the General Electric Co., Ltd., Wembley, for research in electronic conduction phenomena in solid insulators and semi-conductors.

Faversham Town Council has granted a payment of 100 guineas to the borough electrical engineer, **Mr. G. Sommerville,** for services in connection with recent extensions.

Mr. R. H. Garner, lecturer in engineering at Walsall Technical College, has been appointed head of the engineering department at Shrewsbury College.

Obituary

Mr. F. Rook.—The death occurred on July 6th of Mr. Frank Rook, who was with Holophane, Ltd., and was formerly, for many years, with the Metropolitan-Vickers Electrical Co., Ltd., and the Tungsram Lamp Co. Mr. Rook was the youngest son of Mr. James Rook who, prior to the war, was manager of the Sloan Electrical Co. The funeral took place on Friday last week at Golders Green.

Mr. L. Stallybrass.—Following a serious operation the death occurred on July 9th, at Ilkley, of Mr. Leonard Stallybrass. He had been the representative in the Northern area of the Reason Manufacturing Co., Ltd., Brighton, for over twenty-five years, and his loss will be felt by a large circle of friends, both in this area and at Brighton.

Mr. W. H. McLean.—The *Birmingham Post* reports the death of Mr. William Hardy McLean at the age of seventy. Mr. McLean was well known as an electrical engineer in the Midlands. He went from Scotland to Wolverhampton thirty-five years ago, and took up an appointment as consulting engineer to the Midland Electric Corporation, and was actively associated with electrical development in the Black Country and South Staffordshire.

Wills.—Major-Gen. Sir Philip A. Nash, who was chairman of Messrs. W. T. Glover & Co., Ltd., and associated with a number of other concerns, left £113,238, with net personalty £104,718.

Mr. R. A. Chattock, formerly city electrical engineer to the Birmingham Corporation and afterwards chairman of Electric & Gas Industries, Ltd., left £13,761 (net personalty £13,287).

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Metalectric Furnaces, Ltd.—Private company. Registered July 9th. Capital, £30,000. Objects: To carry on the business of manufacturers and distributors of and dealers in electric furnaces of all kinds, &c. The subscribers are: G. C. Castle, "Pomona," Warwick Road, Solihull, Warwickshire; and C. G. Pettit, 101, Earlsbury Gardens, Birchfield, Birmingham. Secretary: J. O'Brien, British Mills, Cornwall Road, Smethwick, Birmingham.

All-in Radio, Ltd.—Private company. Registered July 8th. Capital, £1,000. Objects: To carry on the business of manufacturers of, dealers in and hirers out of wireless and television sets, &c. The directors are: Mrs. K. Griffiths, Mount Royal, Richmond, Surrey; and W. L. Hill, 43, Preston Road, Wembley Park, Mdx. Registered office: 2, The Pavement, Sutton, Surrey.

Holford & Co. (Bournemouth), Ltd.—Private company. Registered July 6th. Capital, £1,000. Objects: To carry on the business of manufacturers, importers and exporters of and wholesale and retail dealers in radio, television, electrical, scientific and telephone apparatus, &c. The directors are: R. Holford and P. J. Holford, both of 18, Richmond Park Avenue, Bournemouth. Secretary: R. Holford. Registered office: 43a, Poole Road, Bournemouth West.

Watmough (Wakefield), Ltd.—Private company. Registered July 4th. Capital, £3,000. Objects: To acquire the business of a wholesale electrical distributor carried on by Agnes F. Watmough at 1, Hatfield Street, Wakefield, together with the assets. The directors are: Mrs. A. F. Watmough, B. Watmough and F. M. Watmough, all of 1, Hatfield Street, Wakefield. Secretary: F .M. Watmough.

Stanley Electrical, Ltd.—Private company. Registered July 4th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in electrical, motor, kinema, steam and general apparatus, &c. The directors are: R. H. Pyne (chairman and permanent managing and governing director), Denfield, 47, Uxbridge Road, Hampton, Mdx.; and J. E. W. Rice, The Ferns, Priory Road, Hampton. Registered office: Latimer Works, Teddington, Mdx.

Electric & Musical Industries (Ireland), Ltd.—Private company. Registered in Dublin July 8th. Nominal capital, £100. Objects: To carry on the business of manufacturers, assemblers and repairers of or dealers in apparatus, plant, machinery and accessories used or capable of being used in connection with the generation, accumulation, transmission, utilisation and supply of electrical energy, &c. The subscribers are: G. E. Grove-White and C. T. Blair-White, both of 13, Upper Ormond Quay, Dublin.

Morphy-Richards, Ltd.—Private company. Registered July 8th. Capital, £2,000. Objects: To carry on the business of manufacturers of and dealers in electrical, gas, radio and television equipment and apparatus, &c. The directors are: D. W. Morphy, The Cloisters, Bickley, Kent; C. F. Richards, Pantiles, The Glen, Farnborough Park, Kent; and H. Best, Bromley Hill Court, Bromley. Secretary: N. Wooldridge. Registered office: 27-8, Finsbury Square, E.C.2.

F. W. Langley, Ltd.—Private company. Registered July 7th. Capital, £10,000. Objects: To acquire as from July 1st, 1936, the business of an electrical engineer carried on by F. W. Langley at Slippery Street, Hanley, Stoke-on-Trent. The first directors are: F. W. Langley, Slippery Street, Broad Street, Hanley, Stoke-on-Trent (chairman); and F. E. Langley, Radstock, Priory Road, Newcastle, Staffs. Solicitors: Huntbach & Son, Eldon Chambers, Bagnall Street, Hanley.

Contactum, Ltd.—Private company. Registered July 11th. Capital, £2,000. Objects: To carry on the business of manufacturers of and dealers in electric switches and accessories of all kinds, plastic mouldings or substitutes, &c. The subscribers are: Irene E. Maher and F. H. Harman, both of 31, Queen Victoria Street, E.C. Solicitor: Albert M. Oppenheimer, 31, Queen Victoria Street, E.C.

Modern Telephone Co., Ltd.—Private company. Registered July 10th. Capital, £3,000. Objects: To carry on the business of manufacturers and installers of and dealers in instruments or plant for use in connection with telephones and telegraphs, and electrical apparatus, &c. The subscribers are: L. C. Williams, 121, Valley Road, Kenley, Surrey; and E. W. Bishop, 16, Noel Terrace, Forest Hill, S.E.23. Secretary: W. M. Campbell. Registered office: 76, Victoria Street, S.W.1.

Returns of Electrical Companies

Associated Electrical Industries, Ltd.—Satisfaction to the extent of £1,036,353 on June 10th, 1936, of trust deed dated February 18th, 1902, and two supplemental trust deeds dated August 31st, 1903, and August 2nd, 1904, and registered February 28th, 1902, September 8th, 1903, and August 4th, 1904, respectively. The unissued stock has been cancelled.

English Electric Co., Ltd.—Satisfaction in full on March 27th, 1936, of (a) debenture dated December 14th, 1934, and registered December 20th, 1934, and (b) charge dated January 20th, 1936 (supplemental to a debenture dated December 14th, 1934) and registered February 3rd, 1936.

Kensington and Knightsbridge Electric Lighting Co., Ltd.—Capital, £500,000 in 400,000 ordinary shares of £1 and 10,000 6 per cent. 1st preference and 10,000 5 per cent. 2nd preference shares of £5. Return dated March 11th, 1936. 390,525 ordinary, 10,000 1st and 10,000 2nd preference shares taken up. £179,840 paid on 79,840 ordinary, 10,000 1st preference and 10,000 2nd preference shares. £310,685 considered as paid on 310,685 ordinary shares. Mortgages and charges, £140,000.

Supremus Specialities, Ltd.—Particulars filed of £1,000 debentures authorised June 19th, 1936, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £700.

Banbury & District Electric Supply Co., Ltd.—Capital, £75,000 in £10 shares. Return dated March 27th, 1936. All shares taken up. £50,000 paid. £25,000 considered as paid. Mortgages and charges, nil.

Kensington Radio Co., Ltd.—Capital, £2,000 in £1 shares. Return dated December 19th, 1935 (filed May 12th, 1936). 1,150 shares taken up. £2 paid. £1,148 considered as paid. Mortgages and charges, nil.

Harrow Electric Light & Power Co., Ltd.—Capital, £50,000 in 3,333 4½ per cent. preference and 6,667 ordinary shares of £5. Return dated March 24th, 1936. All shares taken up. £50,000 paid. Mortgages and charges, £25,000.

Edison Swan Cables, Ltd.—Capital, £150,000 in 100,000 preference shares of £1 and 200,000 ordinary shares of 5s. Return dated April 9th, 1936. 900 preference and 200,000 ordinary shares taken up. £50,900 paid. Mortgages and charges, £200,000.

Electrical Contracts & Maintenance Co. (1925), Ltd.—Capital, £3,000 in £1 shares. Return dated May 20th, 1936. 2,405 shares taken up. £2,405 paid. Mortgages and charges, nil.

Readylock, Ltd.—Issue on July 2nd, 1936, of £425 debentures, part of a series already registered.

City Notes

The Anglo-Argentine Tramways Co., Ltd., held its annual meeting on Tuesday last, when the Duke of Atholl (chairman), who presided, said that despite the fact that nine million more passengers were carried than in the previous year, after converting into sterling the deficit in Buenos Aires of 202,149 pesos at the average free market rate of exchange for the year and adding expenditure actually incurred in sterling, the deficit for the year was £40,697. To this was added the remuneration of the capital employed, which brought the deficit to £656,432, after providing for the annuity to the City of Buenos Aires Tramways Co. and the interest, including arrears, on the loan capital. If £359,000, representing unpaid dividends corresponding to the year on a preference share capital of £6,250,000, was also included, the net results would be inadequate by £1,015,000, without considering a fair return on the ordinary share capital. They continued to suffer increased competition, the imposition of paving charges, taxes and restrictions arising from the terms of a concession granted many years ago and the handicaps of the currency situation. The decline in the value of Argentine currency was a contributory cause of their difficulties. There was an increase in the number of public service vehicles, other than trams, in Buenos Aires, and fare-cutting was rife. Co-ordination was the only way to settle this trouble and establish a unified and economic system, and in September last the Argentine Chamber of Deputies had passed the Bill providing for a special Commission to determine the basis and methods of co-ordination and it was hoped that it would be definitely sanctioned during this year's sessions of Congress.

The Young Accumulator Co. (1929), Ltd., reports a net profit for the year ended March 31st last of £6,476 (against £6,156 in 1934-35), which with £1,730 brought in is carried forward. The report states that considerable money has been spent on development and research work, and an additional building has been erected and machinery installed to cope with orders which were now being received. Presiding at the annual meeting held on July 10th, Lt.-Col. T. P. Winley (chairman), in referring to development and research expenditure, said that development in different fields of production which it had made possible would produce favourable results for the company in the immediate future. Substantial orders for new types of batteries were in hand, notably for the new "Metadyne" trains about to be introduced. The capital of the company had been increased to £130,979, but the new money having been received only just prior to the end of the financial year, the benefit would not be felt until the current period. The turnover of the company had increased, but the strong upward movement in the prices of the principal commodities which they used in their manufactures had had its effect on trading profit. This increase of the price of raw materials was partly offset by improved production methods. They were benefiting by the rapidly growing market for large batteries, and in conjunction with an electric vehicle firm they had designed a battery for driving omnibuses and had orders to supply them to a transport organisation.

The Bagdad Light & Power Co., Ltd., held its annual meeting on July 10th, when Sir William G. Max Muller (chairman), said that the year under review had been one of tranquillity in Bagdad, and relations with the Iraq Government were on a friendly basis. Sales both for domestic and industrial purposes had shown steady progress, and while a large proportion of revenue came from sales at low rates, it was hoped that the liberal policy in this respect would be recompensed by still further increased sales. The new services connected during the year totalled 2,304 and there was a net advance in the number of consumers of 2,139, bringing the total to 11,081. Generating plant, mains and services were in good condition, but there still remained some old military lines which required replacing or reconditioning, while the change-over from d.c. to a.c. in areas approved by the Government would entail heavy capital expenditure. As to the future the managing director had visited Bagdad and was convinced that they could reasonably look forward to continued and progressive development, provided that political conditions remained unchanged.

Thomas Bolton & Sons, Ltd., report a gross manufacturing profit of £163,080 for the year ended March 31st last, as compared with £130,412 in the preceding year. The net profit for the year is £127,218 (against £103,185), and after deducting debenture interest and financial charges (£28,932), depreciation (£40,000), transfer to reserve against investments (£1,000), and writing off expenses of the previous year's issue of 4½ per cent. first mortgage debenture stock, amounting to £16,758, it is proposed to maintain the dividend at 7½ per cent., less tax, leaving £17,031 to be carried forward. A considerable programme of plant development is in hand, of which only a small proportion became effective last year. Two of the directors, Mr. G. Rathbone and Sir T. O. Callender retire and offer themselves for re-election. The other directors of the company are Mr. T. Bolton (chairman), Mr. F. A. Bolton, Brig.-Gen. A. C. Critchley, Mr. J. Ferguson, and Mr. G. H. Nisbett. Mr. C. Pipkin is alternate director for Sir T. O. Callender.

Greenwood & Batley, Ltd.—Presiding at the annual meeting held on July 9th, Col. H. A. Micklem (chairman) said the improved conditions at home referred to last year had been maintained, and their sales for the year under review had increased by nearly 12 per cent. The orders on hand showed a large increase over the corresponding date last year, which was distributed over most of the departments. During last year 27 per cent. of their sales were made abroad, and sales to date this year and orders outstanding showed a still larger percentage abroad. Such contracts were obtained in keen rivalry with foreign manufacturers and were dependent on their being able to compete with them successfully as regarded price and quality, and the raising of wages must inevitably weaken their capacity in this respect. The outlook for the current year justified sober optimism.

Aron Electricity Meter, Ltd.—Presiding at the annual meeting held on Monday last, Mr. H. Kahn (chairman and joint managing director) said that in spite of the increased turnover in London the manufacturing cost of electricity meters had risen owing to an advance in wages and prices of materials, and in consequence their selling price had recently been raised. The Austrian company had recorded a smaller loss than in the past year and the taximeter results had been practically unchanged. With regard to the future, the taximeter business remained fairly stable, as were affairs in Austria, while in London orders for electricity meters for the current year showed a definite improvement. The dual-coin prepayment meter had been in demand since its introduction last year and its output was increasing, while further additions to the list of products were in hand.

The Electrical Finance & Securities Co., Ltd., held its annual meeting on July 9th when Mr. G. H. Nisbett (chairman), who presided, said that with regard to the notices received from the Harrow and the Rickmansworth and Chorley Wood Urban District Councils of their desire to purchase the undertakings in the areas of the respective councils, the company had been successful in obtaining an extension of time during which they should have possession of these undertakings until 1951. Now that these negotiations were definitely out of the way, the directors were giving their attention to the capital requirements of the company, and they proposed in the near future to make an announcement to the shareholders regarding this matter.

Falk, Stadelmann & Co. report a profit for the year ended March 31st last of £117,069, an increase of £8,711 as compared with the preceding year. To this is added £2,615 surplus from realisation of investments and reinstatement of amount previously written off shares in a subsidiary company, making with £18,951 brought in £138,636 available. After deducting income tax and the preference dividend it is proposed to pay an ordinary dividend for the year of 10 per cent., less tax (against 8½ per cent.), to place £15,000 to reserve, £5,000 to staff funds, and to carry forward £20,752.

Max Stone, Ltd.—At an extraordinary meeting held on July 10th proposals to increase the capital to £210,000 were approved. Mr. S. Walton (chairman), in announcing an ordinary dividend of 15 per cent., said that the profit since the formation of the company in January last was in excess of that which was foreshadowed in the prospectus, and far exceeded expectations. The balance of the profit, after payment of the dividend, would be devoted to the writing off of the expenses incurred in the formation of the public company.

The Atlas Electric & General Trust, Ltd., held its annual meeting on July 9th, when Mr. W. S. Poole (chairman), who presided, said that with regard to the subsidiary company, Sociedad Commercial de Montevideo, although the economic situation in Uruguay had improved, political conditions had been most difficult. The gross revenue of that company had, however, increased by over 3½ per cent., as compared with an increase of just over 1 per cent. in the previous year.

The Nigerian Electricity Supply Corporation reports a net profit for the year ended February 29th of £34,335, as compared with £24,909 for 1934-35. A sum of £10,000 is written off debenture stock discount, £6,996 is placed to debenture stock redemption and £7,500 to income-tax provision. The dividend for the year on the preferred ordinary shares is 4½ per cent. (against 3½ per cent.), and £2,433 is carried forward. Meeting, July 21st.

The Great Northern Telegraph Co.'s Holding Co., Ltd., of Denmark, reports that the revenue derived from the dividends on the holdings of shares in the Great Northern Telegraph Co., amounted to 2,240,000 kr. for the year ended June 30th last. The profit, after charging 383,191 kr. for taxes, amounted to 1,903,447 kr. (against 1,892,528 kr.). It is proposed to maintain the dividend at 23½ per cent.

Christy Bros. & Co., Ltd., report a net profit for the year ended March 31st last (including £4,347 surplus on sale of investments) of £38,323, as compared with £33,081 for the preceding year. The ordinary dividend for the year is maintained at 10 per cent., and £21,018 is carried forward (against £18,638 brought in).

Chadburn's (Ship) Telegraph Co., Ltd.—The accounts to March 31st last (the first since reorganisation) show, after deducting costs of reorganisation and writing off certain sums for depreciation, &c., a balance of £2,594. It is proposed to pay a dividend of 4 per cent. per annum and to carry forward £763.

Crossley Bros., Ltd., announce dividends of 5 per cent., less tax, on the 5 per cent. cumulative preference shares, and 5 per cent., less tax, on the non-cumulative preferred shares, but no deferred payment.

The London Electrical & General Trust, Ltd., has announced a dividend of 5 per cent. on the ordinary stock in respect of the year to June 30th (same). The new ordinary stock ranks for this dividend from February 12th.

Edmundson's Electricity Corporation, Ltd., reports that the results of the operations of its group of companies during June, as compared with the corresponding month of 1935, show an increase of 22 per cent. in kWh units sold.

The Electrolytic Zinc Co. of Australasia is paying a final ordinary dividend of 6 per cent., making 10 per cent. for the year (against 5 per cent.).

The Electrical Distribution of Yorkshire, Ltd., is maintaining its ordinary interim dividend at 4½ per cent.

Ultra Electric (Holdings), Ltd., proposes to pay a dividend of 6 per cent. actual on the ordinary shares.

The North Metropolitan Electric Power Supply Co. has declared an interim dividend of 4 per cent. on the ordinary stock.

Strand Electric Holdings, Ltd., proposes to pay a dividend of 8 per cent., actual, in respect of the period ending July 11th.

Stocks and Shares

TUESDAY EVENING.

THE international situation causes a cloud of obscurity to hang over many of the Stock Exchange markets. The political agreement reported between Germany, Austria and Italy, adds another element of doubt to the European outlook, although in the Stock Exchange the view is generally taken that the latest developments are likely to prove beneficial, in that they point to a desire to preserve international peace. The fact of the French being far from satisfied is a principal cause of restraint, so far as Stock Exchange business is concerned. In some of the markets, a fair volume of trade is proceeding; in others, business has come to something that approaches a full-stop. Price changes in our lists are of no great significance. The way in which the comparatively high quotations are held is the best indication that can be desired of the confidence with which investment regards the electrical industry and its constituents.

Electricity Supply Issues

Shares in the home electricity supply group are neglected. Apart from the firmness of Southern Areas new shares at 3s. premium, and unimportant shrinkages in British Power and Light shares to 31s. 3d. and West Gloucestershire stock to 124, quotations are not materially altered. Llanellys are quoted at 25s. 3d., ex-rights to the new preference shares, which are about 1s. premium over the issue price of 27s.

Among shares of companies having interests abroad, Whitehall Electric preference recovered sharply from 21s. to 24s. on

the belief that the fall had gone further than was justified. Atlas Trusts drooped to 5s. 9d. after the meeting, at which the chairman made it clear that resumption of dividends on the ordinary shares was mainly dependent on more considerate treatment being accorded by the Uruguayan Government to the company's Monte Video tramway subsidiary. Palestine "A" shares are a few pence harder at 47s. Victoria Falls advanced to £4 on further consideration of the report. There are small losses in Peraks, 25s. 6d., Tokyo "sixes," 81, and East Africans, 30s. 6d.

Electrical Equipment

Sustained demand for Telegraph Condensers has carried the price up to 2$\frac{3}{16}$, the shares being in persistent demand. A gain of $\frac{3}{8}$ is shown over the last three weeks, but the shares are still well under their recent best level. Hall Telephones are better at 21s., but others in the telephone group are slow to respond to the Postmaster-General's latest reductions. Lancashire Dynamos are shown, in our table reproduced from the Stock Exchange Official List, as having spurted $\frac{5}{16}$ since last week. Actually the rise, which is due to reports of good current trading, has been spread over a longer period. Reyrolles dropped 1s. to 71s. 9d. Young Accumulators are firm, at 2s., on the confident tone of the general meeting. Hopes of a better report from the company produced an improvement of 3 points in Brush stock. No ordinary dividend has been paid since 1931. Associated Electricals and London Electric Wires each gained a few pence. General Electrics and Johnson and Phillips show an easier tendency. General Electric new shares have given way to 18s. 3d. premium. Revo Electrics at two guineas are a florin better.

Aron Electricity Meters

The electrical equipment market, having enjoyed two or three weeks of all-round cheerfulness, intermingled with real activity in some directions, has fallen upon quiet days again. Prices, however, show no sign of backsliding, and, judging by the way the market responded recently to the results of Callender's and the General Electric Company, the receipt of any further good news is likely to set things moving once more.

During the past week, Aron Electricity Meters have maintained the market's reputation for always providing at least one particularly bright spot. Crompton Parkinsons have, of late, successfully filled that rôle, and continue to claim interested attention. The price of Cromptons, 4$\frac{5}{16}$, is unchanged on the week after comparatively slight fluctuations. Arons jumped five shillings to 67s. 6d. Immediately after the report, a fortnight ago, the price dipped to £3, the progress shown in the accounts being, apparently, less rapid than some people had hoped. The revival in the shares was based on the belief —confirmed later—that encouragement would be forthcoming at the annual meeting. An exceptional feature of the balance sheet is the strength of liquid assets, which are equivalent to over 40 per cent. of the issued capital.

Wireless

Holders of E. K. Cole shares are provided with plenty of food for thought. They will have no difficulty in digesting, first, the raising of the dividend to 40 per cent., which is 10 per cent. higher than last year's rate, and is up to best expectations. The accounts are made less palatable by the reduction in trading profits occasioned by intense competition in the radio industry. The third, and, possibly, most intriguing point for consideration is the formation of the new Marconi-Ekco Instruments Company, to be owned jointly with Marconi's Wireless Telegraph Co. Some irregularity in the price of E. K. Cole shares is not surprising, all things considered. Shares are changing hands around 28s. Most of Marconi's Wireless shares are held by Cable and Wireless. Marconi Marines at 33s. 9d. are 2s. 6d. higher on the week.

Broadcast Relays gave way to 6s. after the House of Commons debate on the future of the relay exchanges. There was little comfort for shareholders in the Postmaster-General's uncompromising statement of what may be the fate of the exchanges at the end of their three years' grace. Then they will face the prospect of appropriation by the Post Office, without allowance being made for goodwill, loss of profits or in any other form. Lively interest awaits the speech to be made by the chairman at the forthcoming meeting of the Broadcast Relay Services Company.

Miscellaneous Matters

Investment support lifted the price of Transport "C" stock to 106, but supply proved equal to the demand, and the quotation reverted to 105. Cable and Wireless issues have been sold on balance: all three stocks are easier. Western Unions at 8$6\frac{3}{4}$, International "Tel. & Tel." at 14$\frac{7}{8}$, and other American utilities have been going ahead. Radios, a popular gambling counter on both sides of the Atlantic, are up to 12. Brazil Tractions strengthened to 12$\frac{3}{8}$. The Mexican group is unchanged.

Electric and Musical Industries shaded off to 23s. 6d. Allen Wests are attracting some light measure of interest at 5s. 6d., on account of the company's association with Crompton Parkinson. The capital reorganisation of Allen West has involved no call for fresh capital from the shareholders. Raw rubber continues to advance quietly and the share market is rather better.

Share List of Electrical Companies

Home Electricity Companies.

	Nom.	Dividend. Previous.	Dividend. Last.	Price. July 14.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6	—	3 17 5
City of London	1	7½	7½	37/-	—	4 1 1
Clyde Valley	1	7	8	45/-	—	3 11 1
County of London	1	10½	10½	55/-	—	3 16 4
Edmundson's 7% Pref.	1	7	7	35/6	+6d.	3 19 0
Do. Ord.	1	8	8	43/-	—	3 14 5
Elec. Dis. Yorkshire	1	9	9	48/6	—	3 14 3
Elec. Fin. and Securities	1	12½	12½	3½	—	3 17 0
Elec. Supply Corporation ...	1	11	11	59/6	—	3 14 6
Lancs Light and Power	1	7½	7½	38/6	—	3 18 0
Lond. Assoc. Electric	1	—	7	35/-	—	4 0 0
London Electric	1	7	8	39/-	—	4 2 1
London Power Deb. Red. ...	Stock	5	5	108½	—	4 12 2
Metropolitan	1	10	10	51/6	—	3 17 7
Midland Counties	1	7	7½	41/-	—	3 13 1
Mid. Elec. Power	1	8	8	43/9	—	3 13 1
North Eastern Electric Ordinary	1	6	6	34/-	—	3 10 7
Do. 7% Pref. ...	1	7	7	35/6	—	3 19 0
Northampton	1	10	10	53/9	—	3 14 5
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 3
North Met. Elec Ordinary ...	1	10	10	57/6	—	3 9 7
Do. do. 6% Pref. ...	1	6	6	32/-	—	3 15 0
Scottish Power	1	8	8	43/-	—	3 14 5
South London	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	24/-	+3/-	6 5 0
Yorkshire Elec.	1	8	8	45/6	—	3 10 4

Public Boards.

Central Electricity, 1950–70 ...	Stock	5	5	118	—	4 4 0
Do. 1955–75 ...	„	5	5	120	—	4 3 4
Do. 1951–73 ...	„	4½	4½	111	—	4 1 1
Do. 1963–93 ...	„	—	3½	102	+½	3 8 8
London Elec. Trans. Gtd. ...	„	—	2½	96	+1	2 12 1
London & Home Counties, 1955–75	„	4½	4½	113xd.	—	3 19 6
London Passenger Transport, A...	„	—	4½	122½	—	3 13 6
Do. do. B...	„	—	5	128½	+1	3 17 10
Do. do. C...	„	3½	4	105	—	3 16 2
West Midlands Joint Elec. 1948–68	„	—	5	116½	—	4 5 10

Telegraph and Telephone.

American Tel. & Tel.	$100	9	9	167½	—	5 7 6
Anglo-Am. Tel. Pref.	Stock	6	6	128½	—	4 13 5
Do. Def.	„	1½	1½	31	—	4 16 9
Cable & Wireless 5½% Pref. ...	„	4½	5½	103	−1	5 6 10
Do. A. 7½% Ord.	„	Nil	Nil	21½	−½	—
Do. B. Ord.	„	Nil	Nil	6½	−½	—
Globe Tel. & Tel. Ord.	10	3½*	4½*	14½	−½	3 1 6
Do. do. Pref.	10	6	6	14½	—	4 2 9
Great Northern Tel.	10	20	20	45	—	4 9 0
Marconi-Marine	1	10	7½	33/9	+½	4 9 0
Oriental Telephone Ord.	1	12*	12*	3½	—	3 13 10

Home and Foreign Trams, etc.

Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	1/-	—	—
Do. do. 2nd Pref.	5	Nil	Nil	9d.	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	„	5	5	1475	—	—
Do. do. Pref. Ord.	„	8	8	175½	−2	4 11 2
Brazil Traction	100	—	30 cts.	12½	+½	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	102½	—	4 17 7
Mexican Light Common	100	Nil	Nil	3½	—	—
Do. 1st Bonds	$500	5	5	53	—	—
Victoria Falls Ord.	1	20	12	4	+½	3 0 0
West Riding	1	5	6½	50/-	−1/-	2 12 9

Manufacturing Companies.

Aron Electricity Ord.	1	10	15	67/6	+5/-	4 9 0
Assoc. Elec. Ord.	1	6	8	49/-	+6d.	3 5 3
Do. Pref.	1	8	8	41/-	—	3 18 1
Babcock & Wilcox	1	8	8	48/9	—	3 5 8
British Aluminium Ord.	1	7½	7½	40/0	−6d.	3 15 0
British Insulated Ord.	1	15	20	5½	—	3 14 5
Brush Ord.	Stock	Nil	Nil	42½	+3	—
Callender's	1	15	15	4½	—	3 10 8
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord. ...	5/-	—	12½	4 5/16	—	—
Do. 8% Pref.	1	8	8	38/9	—	4 2 6
Edison Swan 1st Pref.	1	7½	7½	30/-	—	5 0 0
Electric Construction	1	3½	7	1½	—	3 14 8
Enfield Cable Ord.	1	25	25	5½	—	4 15 8
English Electric	1	Nil	Nil	23/-	—	—
Do. do. Pref.	1	Nil	Nil	27/-	—	—
Ericsson Tel.	5/-	24	20*	2½	—	3 2 1
Ever Ready	5/-	35	35	27/-	—	6 9 8
Ferranti Pref.	1	7	7	27/6	—	5 1 10
G.E.C. Pref.	1	6½	6½	34/-	+1/-	3 16 6
Do. Ord.	1	10	15	78/0	−6d.	3 17 0
Henleys	1	30	30	7½	—	4 0 0
Do. 4½% Pref.	5	4½	4½	5½	—	3 18 2
India-Rubber Preferred	1	—	5½	1½	—	4 17 9
Johnson & Phillips	1	7½	10	46/-	−3d.	4 7 0
Lancashire Dynamo	1	5	10	2⅜	+ 1/16	3 16 3
Siemens Ord.	1	4	6	28/9	—	4 3 6
Telegraph Construction	£1	Nil	Nil	26/3	—	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be numbered and abridged and all subsequent proceedings will be taken.

1934

29545. "Control of alternating currents." L. H. Harris. October 17th, 1934. (448927.)

32667. "Means for blocking ionic valves on a back-arcing or overload." Allmänna Svenska Elektriska Aktiebolaget. November 16th, 1933. (Cognate application 32668/34.) (448856.)

32790. "Remote control arrangements and feeder arrangements for use in radio and like high-frequency systems." Marconi's Wireless Telegraph Co., Ltd., G. M. Wright and N. M. Rust. November 14th, 1934. (448779.)

33120. "Devices for transforming electric energy by means of grid-controlled vapour discharge tubes." Jenaer Glaswerk Schott & Gen. November 18th, 1933. (449038.)

35418. "Apparatus for the production, reception, conduction, transmission, reproduction, and/or location of sound." D. S. S. Steuart and N. B. M. Douglas-Hamilton, Duchess of Hamilton and Brandon. December 10th, 1934. (448864.)

35721. "Electric discharge lamp devices." British Thomson-Houston Co., Ltd., J. H. Mitchell and C. G. Mayo. December 12th, 1934. (448783.)

35787. "Electrically operated horns." J. Lucas, Ltd., and T. A. Harris. December 13th, 1934. (448786.)

35817. "Electric multiplying machine." L. C. Boutet (legal representative of E. R. Boutet (deceased)). February 14th, 1934. (448787.)

35847. "Electric circuit-breakers." Electrical Improvements, Ltd., R. W. Gregory and J. R. Beard. December 13th, 1934. (448789.)

35872. "Impregnated dielectric material." Dussek Bros. & Co., Ltd., and A. W. Thompson. December 13th, 1934. (448790.)

35986. "Lanterns for electric lamps." British Thomson-Houston Co., Ltd., C. W. Wood and E. B. Tuppen. December 14th, 1934. (448799.)

36149. "Electric lampholders of the bayonet type." General Electric Co., Ltd., and G. W. Gorvin. December 17th, 1934. (448875.)

36202. "Electric generating cells." A. H. Stevens (Winckler Engineering Laboratories, Inc.). December 17th, 1934. (449084.)

36280. "Voltage-control devices for electrical circuits." British Thomson-Houston Co., Ltd., C. G. Mayo and C. E. Fenwick. December 18th, 1934. (449022.)

36281. "Timing devices for electrical circuits." British Thomson-Houston Co., Ltd., C. G. Mayo and C. E. Fenwick. December 18th, 1934. (449023.)

36289. "Electric switch contact members." H. J. Norballe. December 18th, 1934. (449024.)

36397. "Trollies for electric vehicles." B. S. Bamkin and L. H. Pearson. December 19th, 1934. (Cognate application 32800/35.) (449086.)

36455. "Electric incandescent lamps." A. J. Barton and F. Treanor. December 19th, 1934. (449091.)

36485. "Line connector for electric cables." C. Worswick and J. J. Williams. December 20th, 1934. (448946.)

36486/7. "Electric discharge tubes, particularly gasfilled luminous tubes." W. L. W. Schallreuter. December 20th, 1934. (449031/2.)

37144. "Spark plugs for internal-combustion engines." F. Bierlaire. December 28th, 1934. (Convention date not granted.) (448884.)

1935

225. "Luminous electric discharge devices." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Gluhlampen). January 3rd, 1935. (Addition to 445187.) (448887.)

1752. "Electro-magnets for use in organs." N. Hall. January 18th, 1935. (448948.)

2116. "Electric discharge lamps." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. January 22nd, 1935. (448891.)

2214. "Electric imitation solid-fuel fires." L. B. Brett. January 23rd, 1935. (448892.)

2271. "Telephone instruments." D. S. S. Steuart and N. B. M. Douglas-Hamilton, Duchess of Hamilton and Brandon. January 23rd, 1935. (448894.)

3972. "Microphones or transmitters." Siemens Bros. & Co., Ltd., and G. W. Sutton. February 7th, 1935. (449041.)

5403. "Electric totalisators." Ericsson Telephones, Ltd., and F. Limb. February 20th, 1935. (448901.)

6129. "Connection fittings for electric junction boxes." Callender's Cable & Construction Co., Ltd., W. F. Slater and B. A. Maxted. February 26th, 1935. (449044.)

6270. "Photo-electric photometers." Holophane, Ltd., S. English, Everett, Edgcumbe & Co., Ltd., and K. Edgcumbe. February 27th, 1935. (448904.)

9802. "Sparking-plugs for internal-combustion engines." K.L.G. Sparking Plugs, Ltd., L. Marocchi and C. M. Carington. March 29th, 1935. (448913.)

9913. "Variable-inductance tuning device." Hazeltine Corporation. May 5th, 1934. (449110.)

10998. "Sockets for plug-and-socket devices." Ferranti, Ltd., and A. W. Edwards. April 9th, 1935. (448957.)

12482. "Negative electrical resistances." Siemens & Halske Akt.-Ges. April 30th, 1934. (449049.)

15742. "Electric insulators." Ohio Brass Co. June 2nd, 1934. (449052.)

19246. "Electric water or like heaters." O. Tange. July 5th, 1935. (448966.)

19286. "Methods of and apparatus for electric seam-welding." British Thomson-Houston Co., Ltd. July 10th, 1934. (449117.)

21840. "Mercury switch provided with means for retarding the switching operation." Landis & Gyr Akt.-Ges. September 4th, 1934. (448968.)

24038. "Sound-reproducing systems." Electrical Research Products, Inc. September 5th, 1934. (448973.)

24039. "Sound-reproducing systems." Electrical Research Products, Inc. September 22nd, 1934. (Addition to 448973.) (448974.)

24485. "Electric discharge devices." British Thomson-Houston Co., Ltd. September 1st, 1934. (449125.)

25460. "Electric discharge devices." British Thomson-Houston Co., Ltd. September 13th, 1934. (449126.)

25461. "Thermionic devices." British Thomson-Houston Co., Ltd. September 13th, 1934. (449127.)

27200. "Thermally-operated overload switches." British Thomson-Houston Co., Ltd. October 2nd, 1934. (448978.)

31112. "Radio receivers." A. Shepherd. June 1st, 1935. (Divided out of 18785/34.) (449070.)

32393. "Permanent magnets for electrical machines." E. Gross. November 29th, 1934. (448988.)

33649. "Thermionic amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 12th, 1934. (Divided out of 9987/35.) (448993.)

34269. "Apparatus for the production, reception, conduction, transmission, reproduction, and/or location of sound." D. S. S. Steuart and N. B. M. Douglas-Hamilton, Duchess of Hamilton and Brandon. December 10th, 1934. (Divided out of 448864.) (448825.)

34894. "Electric welding electrodes." British Thomson-Houston Co., Ltd. December 24th, 1934. (448994.)

36053. "Electrolytes for use in electrolytic condensers." F. C. Stephan and Telegraph Condenser Co., Ltd. December 31st, 1935. (448830.)

1936

570. "Circuits for electric discharge devices." British Thomson-Houston Co., Ltd. January 7th, 1935. (448833.)

821. "Small polarised synchronous electric motors." Siemens-Schuckertwerke Akt-Ges. January 30th, 1935. (449075.)

2006. ""Electrically heated boilers for heating tar and tar bitumen compounds." J. Molyneux, F. Williams, H. H. Dewhurst, F. Hoon and G. S. Molyneux. June 29th, 1935. (Divided out of 3938/35.) (448997.)

4446. "Apparatus for electrically operated railway and tramway points and for analogous purposes." L. Quilliam and Forest City Electric Co., Ltd. February 14th, 1936. (448841.)

8437. "Mercury-vapour rectifiers." British Thomson-Houston Co., Ltd. March 30th, 1935. (448842.)

10108. "Electric calculating machine" L. C. Boutet. February 14th, 1934. (Divided out of 448787.) (448925.)

13202. "Telegraph keyboard-controlled code-translating apparatus." R. G. Griffith. November 12th, 1934. (Divided out of 447196.) (Cognate application 13203/36.) (448846.)

Trade Mark Applications

The following are among recent applications for British trade marks. Objections against any of the proposed marks may be lodged within one month from July 8th:—

Hotric. No. 566087. Class 8. Electric resistances and electric resistance heating elements. No. 566088. Class 18. Electric cooking apparatus and electric heating apparatus for buildings.—H. Webb & Co. (Engineers), Ltd., West Road, Tottenham, N.17.

Claudgen Neon Signs (lettering and design). No. 567984. Class 8. Electric neon discharge tubes for use as signs for advertising purposes. Claudgen. No. 567986. Class 8. Electrically illuminated signs.—Claude-General Neon Lights, Ltd., Pitman House, Parker Street, Kingsway, W.C.2.

K and Bell (letter and design). No. 566163. Class 8. Fitted electrical combined switch and fuseboards, fuseboards, automatically operated switchboards, fitted switchboards and thermostatic controlling apparatus. No. 567472. Class 13. Electric heating and power fittings.—Klöckner Commandit Gesellschaft, Bayenthal, Cologne, Germany. (British representatives: M. & Wm. Clark, 53-54, Chancery Lane, W.C.2.)

Eliminoise. No. 567480. Class 8. Interference apparatus for use with wireless apparatus.—Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex.

Kaon-Geyser. No. 567682. Class 8. Signs and advertising devices fitted with light reflecting media or with their own means of illumination.—Toon & Heath (Displays), Ltd., 33-35, John Bright Street, Birmingham.

Faradyne. No. 568494. Class 11. Electrical massage apparatus.—Sterling Works (Dagenham), Ltd., Sterling Works, Dagenham, Essex.

Coal-handling and Steam Plant

Among the orders recently received by International Combustion, Ltd., is one for a "Lopulco" tri-drum boiler for the China Light & Power Co., Ltd., Hong-Kong, including an "Usco" plate type air heater complete building, bunkers, and coal-handling plant. The company is also to supply skip winding and coal-handling equipment for Bickershaw Collieries, Ltd. This order consists of a colliery headframe structure and four main belt conveyors complete with electrical equipment, interlocking gear and gantries. The steel headframe will be 110 ft. high from ground level to pulley centres, and the equipment is to be suitable for a skip-winding installation capable of handling run-of-mine coal at the rate of 450 tons per hour. There are to be 1,942 ft. of 48-in. wide conveyors arranged in two sections, each conveyor being driven by a two-speed motor, so that in an emergency one conveyor system can handle the whole of the output. Several "L" stoker orders have been obtained. The ash-handling plant for Belfast Corporation will be an "Usco" water trough chain conveyor capable of dealing with 3½ tons of ash per hour.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alford (LINCOLNSHIRE).—Houses (24); F. Robinson, builder, Spilsby.

Alsager (CHESHIRE).—Public offices; H. V. Lynam, U.D.C. surveyor.

Ashton-under-Lyne.—Houses (56), Lakes Road site; borough surveyor.

Belper.—Cinema, King Street; E. N. Bailey, architect, Bridge Road, Maidenhead.

Blaenavon.—Houses (58); U.D.C. surveyor.

Boston.—Houses (266); D. G. Cockrill, borough surveyor.

Bromley.—Houses (246), Bourne Vale estate, Hayes; L. A. Culliford, architect, 3, John Street, London, W.C.1.

Brownhills (STAFFORDSHIRE).—Houses (200); U.D.C. surveyor.

Burton-on-Trent.—Houses (55), Stapenhill; borough surveyor.

Carlisle.—Modernisation of the kitchens and laundries, Fusehill Institution, for C.C.; P. Dalton, city engineer, 18, Fisher Street. Shops, &c., Botchergate; Co-operative Society, Ltd. Two central schools, Swifts estate (£63,301); J. & R. Bell, Ltd.

Carluke (LANARKSHIRE).—Cinema; Michael Burns, cinema proprietor.

Carshalton.—Houses (102), Cottage Farm estate; R. S. Davey, architect, Stone Court, The Grove.

Caterham.—Houses (68), Foxon Lane; S. Darton. Central school, Wapses Lane (£17,961); E. Clarke & Sons.

Cheam (SURREY).—Junior school, Park Farm (£12,195); H. H. & F. Roll, Ltd.

Chesterfield.—Houses (50), Boythorpe; Houston & Kington, architects. Furniture factory, for T. Greaves & Co., Ltd., Knifesmithgate. Development of Brookside Farm estate; W. H. Hancock. Foundry, stores, and laboratory, Clayton Street, for R. Hyde & Son, Ltd.

Clacton-on-Sea.—Houses (23), Little Clacton, for R. H. Collins. Block of residential flats, Holland House site; G. H. B. Gould, architect, Station Road.

Clare (SUFFOLK).—Houses (24); R.D.C. surveyor.

Clydebank.—High school (£90,000); burgh surveyor.

Colchester.—Houses (125); borough engineer.

Consett (DURHAM).—Houses (33); J. J. Eltringham, architect, Derwent Street, Blackhill.

East Grinstead.—Houses (48); U.D.C. surveyor.

Edgware.—Factory, Deansbrook Road; E. Howard & Partner, architects, 3, St. James's Street, London, S.W.1.

Ellesmere (SHROPSHIRE).—Houses (30); U.D.C. surveyor.

Gillingham (KENT).—Houses (40), Forge Lane; borough surveyor.

Glasgow.—Confectionery works, Anniesland, for Birrel, Ltd.

Hastings.—Houses (95); W. W. G. Parker, builder, High Ongar, Essex.

High Wycombe.—School (800 places), for Borough E.C.; S. C. A. Webb, secretary.

Hove.—Town hall, magistrates' court, &c. (£51,000); borough surveyor.

Huddersfield.—Extensions to Technical school (£67,177), for E.C.

Ilkeston.—Houses (40), Corporation Road; Charnos Hosiery, Ltd. Cinema and shops, South Street; E. H. Stone, architect.

Irish Free State.—(LIMERICK).—Houses (94), Thomondgate Old Distillery site; C. Stenson, city engineer, Town Hall.

Lanarkshire.—R.C. school, Coatbridge (£44,800); county architect, Hamilton.

Lancaster.—Houses (64), Vale estate; H. Priestley, builder, Vale estate.

Laverstock (SALISBURY).—Houses (300), Laverstock Hall estate, for Forder & Sons.

Ledbury (HEREFORD).—Houses (26); U.D.C. surveyor.

Leicester.—Factory, Western Boulevard, for Patons & Baldwins, Ltd., Halifax.

Limpsfield.—Estate development, Rockfield Road; Ransome & Coote.

Liverpool.—Office premises, Canning Place and Coopers Row, for the National Union of Seamen, 22, Canning Place; George Platt & Sons, Ltd., builders, Westmoreland Street.

Liversedge (YORKSHIRE).—Houses (90), Lumb Lane, for Stanley & Welsh.

Llandudno.—Hospital; R. Norman MacKellar, assessor architect.

London.—(DULWICH).—Nurses' home, &c., Constance Road Institution (£74,380); L.C.C. architect. (KENSINGTON).—Tenements, Bramley Road (£22,505); borough engineer. (LEWISHAM).—Two factories, Worsley Bridge Road; Commercial Structures, Ltd., Staffa Road, E.7. (POPLAR).—Tenements (106), Millwall estate (£40,891); Gee, Walker & Slater, Ltd., Berkeley Square, W.1. (WANDSWORTH).—Tenements (1,032), Wandsworth Road (£570,000); L.C.C. architect.

Lowestoft.—School, Notley Road; borough surveyor.

Malvern.—Cinema, Malvern Link, for Capt. R. W. Limbert.

Manchester.—Houses (105), Melverley Road, Darlaston Avenue and Munn Lane, Brackley; J. Saxon, builder, 27, Brooklands Road, Crumpsall. Houses (100), rear Wythenshawe Road and Yew Tree Road, Wythenshawe estate; Littler & Rich, builders, Kings Road, Stretford.

Melksham (WILTSHIRE).—Houses (86), Lambourne estate; R. P. Pearce, U.D.C. surveyor.

Middlesbrough.—Houses (94), fronting on Marton Road; borough engineer. Houses, West Lane; J. Gilmore, builder, 111, West Lane. Houses, Yarm-Marske Road; Wetherell, Dent & Pickersgill, architects, Lloyds Bank Chambers, Barnard Castle.

Mill Hill.—Cinema, shops and flats, Watford Way; R. G. Cox, architect, 60a, High Street, Acton, London, W.3.

Nantwich.—Houses (79); R.D.C. surveyor.

Newbiggin (NORTHUMBERLAND).—Houses; J. Kailofer, U.D.C. surveyor.

Newcastle-on-Tyne.—Additions, comprising 20,000 square feet of floor space, for Scott & Turner, Ltd.; Stanley Miller, Ltd., builders, 17, North Street.

Oldbury.—Houses (140), Holt Farm estate; borough engineer. Reconstruction of Bristnall Hall school, for E.C.

Ossett.—Houses (28), Swithenbank estate; borough engineer. Houses (56), Town End; S. B. Nettleton.

Oswestry (SHROPSHIRE).—Houses (26); borough surveyor.

Portsmouth.—Theatre, electrical work, London Road, for the Odeon Theatres, Ltd.; Andrew Mather, architect, Leicester Square Chambers, London, W.C.2. Houses (429); Drayton Manor Estate Co. Junior school, Court Lane (£12,987); Frank J. Privett, Ltd.

Reigate.—Extensions to Institution (£17,000); Higgs & Hill, Ltd.

Renfrewshire.—Junior instruction centre, Greenock Glebe School, for C.C. (£20,000); county architect, County Buildings, Paisley.

Romford.—Council offices (£20,330); U.D.C. surveyor.

Rowley Regis (WORCESTERSHIRE).—Houses (560); borough surveyor.

Royton.—Houses (36), Royley site; R. & T. Howarth, Ltd., builders, Crossfield Works, Rochdale.

St. Helens (LANCASHIRE).—Houses (48), for A. J. Kenwright.

Scarborough.—Houses, near Seacliff Gardens; Wilkinson & Guthrie, architects, St. Nicholas' Street. Additions to premises, Albemarle Crescent, for the Capitol and Londesborough Theatres (Scarborough), Ltd.; Jones & Rickaby, architects, 102, Westborough.

Selsdon (SURREY).—Cinema, Addington Road; W. Fisher.

Sevenoaks.—Cinema; James Watt, builder, 1, Central Parade, Bromley Road, London, S.E.

Shoreham-by-Sea (SUSSEX).—Houses (75), Stoney Lane site; U.D.C. surveyor.

Somerset.—Senior school, Ansford, Castle Cary, for County E.C.; A. J. Toomer, county architect, Park Street, Taunton.

South Shields.—Houses (76), Harton Colliery and Boldon Lane; G. Bailey, Ltd., builders, 67, King Street.

Spalding.—Extensions to Grammar school (300 places), for the governors; Sir Felix Clay, architect, 18, Kensington Park Gardens, London, W.11.

Staffordshire.—Technical school, Newcastle; director of education, Stafford.

Stirling.—Houses (24), Cambusbarron, for C.C.; D. W. Glass, architect, Dumbarton Road. Houses (90), Carronshore and Haggs, for C.C.; Wilson & Tait, architects, Grangemouth. Houses, Larbert, for the Royal Scottish National Institution; James Miller, architect, 15, Blythswood Square, Glasgow.

Stockport.—Houses, Ramsdale Road, Carwood estate; T. Walker & Son, Ltd., builders, 46, Edgerton Road, Davenport. Cinema, for the Palladium (Stockport), Ltd.

Stockton-on-Tees.—Houses (26), Brentford Road; Lane, Fox & Co., Ltd., builders, Norton Road, Norton-on-Tees.

Stokesley (YORKSHIRE).—Houses (24); R.D.C. surveyor.

Stonehouse (LANARKSHIRE).—Cinema; J. E. Sheeran, Portobello.

Stretford.—Houses (434), Lostock; borough engineer. Offices and flats, Stretford Road; Liverpool Victoria Friendly Society. School, Lostock, for E.C.

Sunderland.—Chair-making factory, Warren Street, for Messrs. Ditchburn; J. Huntley & Sons, builders, Marion Street. Maternity block to the Municipal Hospital (£20,880); J. W. White, builder, High Barnes Works.

Surbiton (SURREY).—Houses (187), Red Lion Road & Clayton Road; U.D.C. surveyor.

Surrey.—Central school, Lingfield, for County E.C.; secretary, Kingston-on-Thames. Extensions to Warren Road Hospital, Guildford (£47,000); county architect.

Sutton Coldfield.—Houses (20), near Grange Lane; H. H. Laskey.

Swale (KENT).—Houses (140); R.D.C. surveyor, Faversham.

Swansea.—Houses, Bonymean estate and Townhill; borough architect.

Swindon.—Houses (52), Rodbourne Green estate; T. Burrington.

Tadcaster (YORKSHIRE).—Houses (26), Allerton; R.D.C. surveyor. Houses (22), Sherburn; R. M. Thompson, Ltd., builders.

Tamworth.—Houses (50); borough surveyor.

Tipton.—Extensions to Brymill steel works, Bloomfield Road; British Rolling Mills, Ltd. Extensions to factory, Groveland Road; Revo Electric Co., Ltd.

Tonbridge.—Houses (46); R.D.C. surveyor.

Torquay.—Estate development of Marldon Road; Premier Trust Co., Ltd. Extensions to Pavilion (£20,000); borough engineer.

Wakefield.—Houses (32), Woodthorpe Park estate; Ledgar Holdsworth.

Wallingford.—Houses (32), Cooper's Place; borough surveyor.

Watford.—Houses (44), Meadow Road; Hillingdon Estate Co. Municipal offices; Dr. Oscar Faber, heating consultant.

Wetherby (YORKSHIRE).—Houses (40); Pennington, Hustler & Taylor, architects, Ropergate, Pontefract.

Wiltshire.—Junior and infants' schools, Lower Stratton; director of education, Trowbridge.

Wishaw.—Houses (236), £90,000; burgh surveyor.

Wolverhampton.—Houses (30), Church Road, Oxley; J. C. Freeman & Son, Ltd. Extensions to works, Eagle Street; A. W. Sutton & Co. Extension to works, Heath Town; Mander Bros., Ltd.

Worthing.—Houses (22), Goring Park estate; Wignall & Ainsworth. Houses (28) and flats, Meadow Road; borough engineer. Houses (48), St. Lawrence Avenue; Gladeside Estates, Ltd.